WRD RESOURCE ROOM

BICY
654741

BIG CYPRESS NATIONAL PRESERVE
WATER QUALITY REPORT
1988

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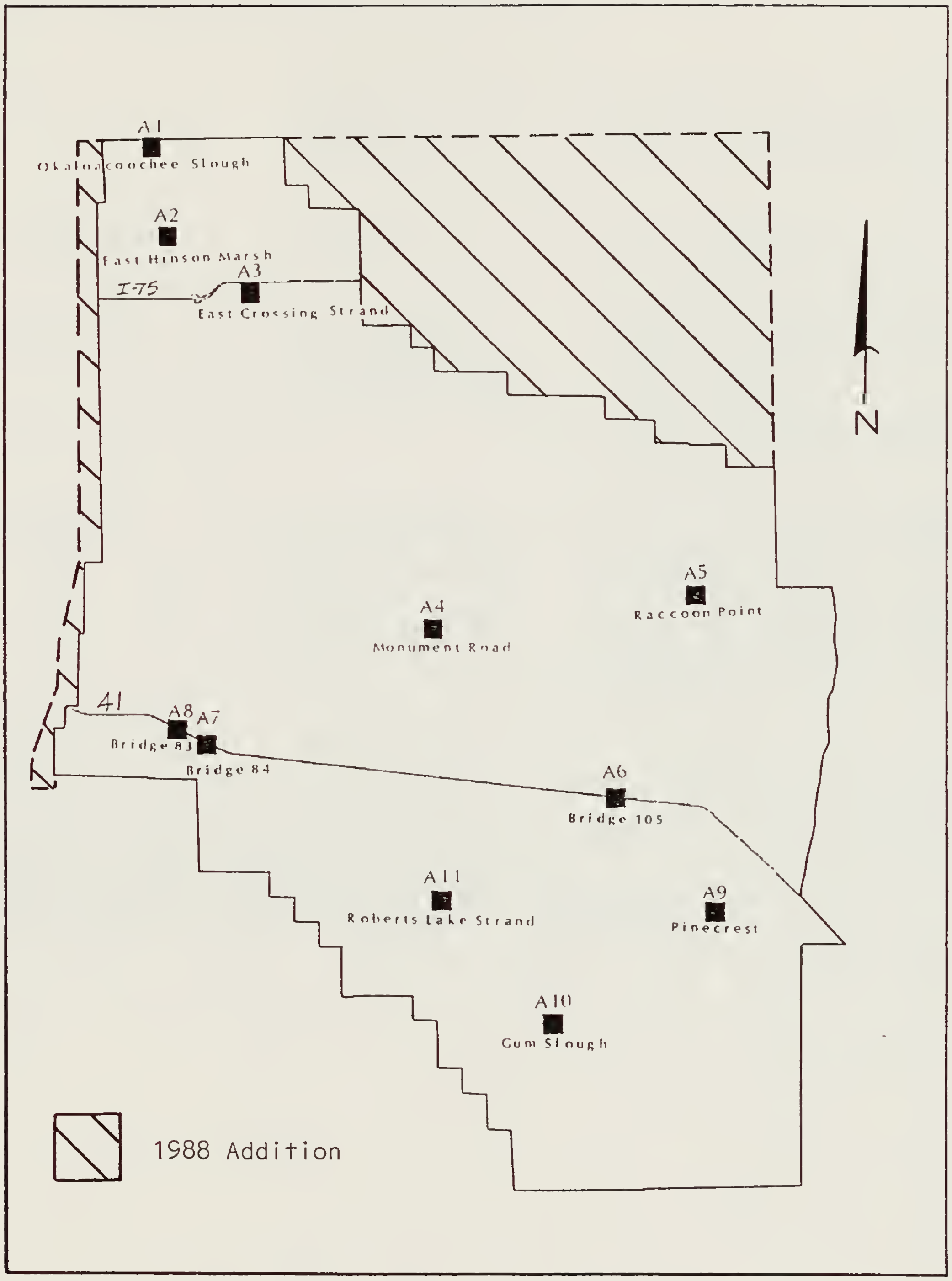
INTRODUCTION

Big Cypress National Preserve was established to assure the preservation, conservation, and protection of the natural, scenic, hydrologic, floral and faunal, and recreational values of the Big Cypress watershed, as stated in Public Law 93-440. In order to comply with this Federal Law, Big Cypress National Preserve (BICY) established a continuous water quality monitoring program in 1988. According to Section 17-3 of the Florida Administrative Code (F.A.C.), the surface waters within BICY have been designated as Outstanding Florida Waters (17-3.041 F.A.C.). This resource designation receives the highest level of protection through the Florida Department of Environmental Regulations (DER) permitting process. The BICY water quality monitoring program will provide a continuous evaluation on the pristine water resources within the Preserve. This program is designed to generate a data base from which future pollution impacts can be ascertained from an anomaly arising in one or more of the measured parameters.

The water quality monitoring network consists of eleven stations located along major flow regimes, oil and gas developments, canals, and agriculturally sensitive areas within the Preserve's boundary, see Figure 1. The sampling frequency shown in Table 1, is designed to sample each site monthly for field parameters (water temperature, specific conductivity, dissolved oxygen, alkalinity and pH). Station A7 is only monitored for water temperature and specific conductivity each month. Trace metals (As, Cd, Cu, Pb, Hg, Zn) are analyzed twice each year at stations A3, A5, A9 and three times per year at stations A1, A4, and A10. Nutrients and other lab parameters (NO2, NO3, NH3, OPO4, Cl-, Ca++, Mg++, Na++) are analyzed six times per year at stations A1, A3, A4, A5, A9, and A10. It is very important to maintain this scheduled frequency in order to produce valid trends. Variations in the schedule will produce false anomalies in the various chemical parameters for site, yearly and monthly comparisons.

This annual report provides a graphical summary of the various water quality parameters collected at the eleven BICY monitoring stations in 1988. The monitoring program started in February, 1988, thus samples were not collected in January, 1988.

Hydrological data was not collected from the recent 146,000 acre addition. The addition was established by Public Law 100-301 in 1988, see Figure 1.



BIG CYPRESS NATIONAL PRESERVE: Water Monitoring Stations

FIGURE 1

PARAMETER	FREQUENCY	MONITORING STATIONS
*Field Parameters	Monthly	All stations (except Bridge 84)
**Lab Parameters	Bi-monthly (Feb.Apr.Jun. Aug.Oct,Dec)	Okaloacoochee Slough Monument Road Gum Slough East Crossing Strand Raccoon Point Pinecrest
***Trace Metals	3 times/year (Apr.Jun.Nov)	Okaloacoochee Slough Monument Road Gum Slough
	2 times/year (Apr,Jun)	East Crossing Strand Raccoon Point Pinecrest
Specific Conductance	Monthly	Bridge 84

* Field Parameters: water temperature, specific conductivity, dissolved oxygen, alkalinity and pH.

** Lab Parameters: ammonium, calcium, chloride, magnesium, nitrate, nitrite, orthophosphorus, and sodium.

*** Trace Metals: arsenic, cadmium, copper, lead, mercury and zinc.

TABLE 1

SITE SELECTION, METHODS AND MATERIALS

The purposes for choosing the eleven monitoring stations are defined in Table 2. Four stations are located along borrow canals; Bridge 105 (A6), Bridge 84 (A7), Bridge 83 (A8), and Roberts Lake (A11). Monitoring stations at Bridge 84 and Bridge 83 were established to monitor the Turner River system and Roberts Lake was installed for baseline monitoring. The remaining stations are located in natural flow regimes. Okaloacoochee Slough (A1) monitors the impacts from external land-use north of the Preserve. East Hinson Marsh (A2) and Raccoon Point (A5) were established for monitoring oil and gas impacts. East Crossing Strand (A3) was established to monitor the impacts of Interstate 75 which cuts across the northern Preserve. Pinecrest (A9) and Gum Slough (A10) were established as baseline sites.

Monitoring stations were sampled "on site" at about the same time of the day to minimize diurnal fluctuations between monthly collections. Water temperature and conductivity were measured using a YSI Model 33 S-C-T meter. pH was measured using the Orion Model SA250 meter. Dissolved oxygen was measured using the Hach Model OX-DT digital titrator and alkalinity was measured using the Hach Model AL-DT digital titrator.

Nutrient and metal parameters were analyzed by Thorton Laboratories, Inc., in Tampa, Florida. Samples were collected in pre-treated nalgene sample bottles, immediately iced, and shipped to Thorton Laboratories, Inc. within the required holding times (received within 24 hours) as defined by E.P.A.. The various E.P.A. methods and detection limits for each parameter are given in Figure E1.

MONITORING STATION	PERIOD OF RECORD	PURPOSE
Okaloacoochee Slough	1988	Baseline: impacts from external land use north of BICY.
East Hinson Marsh	1988	Oil and gas impacts.
East Crossing Strand	1988	Impacts of I-75 construction.
Monument Road	1978-present	Baseline
Raccoon Point	1988	Oil and gas impacts.
Bridge 105	1939-present	Baseline
Bridge 84	1960-present	Turner River restoration.
Bridge 83	1978-present	Turner River restoration.
Pinecrest	1978-present	Water releases.
Gum Slough	1978-present	Baseline
Roberts Lake	1978-Present	Baseline

TABLE 2

RESULTS

TEMPERATURE

Water temperatures at all monitoring stations in 1988 were fairly consistent, Figure A1. A geometric mean of 23.1 degrees celsius, Figure C1, was recorded for all stations. Since no samples were collected in January, one would expect the geometric mean to be slightly lower for 1988. The monthly comparison of water temperatures for all stations, Figure B1, shows seasonal fluctuations. The slow migration of the shallow sheet flow and confined canal systems of BICY are greatly influenced by the air temperature. The warmer water temperatures of April, May, June, July, August, and September reflect the warmer air temperatures in south Florida during these months. This contrasts the progressively cooler water temperatures recorded from October through December. Again, reflective of the relatively cooler air temperatures during the fall and winter months.

SPECIFIC CONDUCTIVITY

A geometric mean of 396 umhos for specific conductivity was recorded for all stations in 1988, Figure C2. Specific conductivity values reflect the annual wet and dry seasons of south Florida. Approximately 80 percent of the annual precipitation falls during a six month rainy season, May through October (Schneider and Flora, 1986). As shown in Figure B2, relatively lower specific conductivity values were recorded during the wet months of May through October. This is attributed to the compounding recharge produced from the less conductive precipitation on the local surface waters. As the surface waters begin to lower, the concentration of dissolved ions increases, thus increasing the specific conductivity of these waters. As a result, during the dry season of April through November, the specific conductivity concentrations begin to progressively increase. The major source of these dissolved ions is from the dissolution of the Tamiami Limestone, which is extensive in the Preserve.

As shown in Figure A2, relatively higher specific conductivity values were recorded at station A8. This station is located on Turner River at Bridge 83. This is caused by local canals, Turner River Canal and Barron River Canal, rapidly draining off the fresh waters in the Turner River watershed. As a result, there is not enough fresh water discharge in Turner River to prevent the encroachment of the more conductive saline waters. Work is currently being conducted to restore natural flow in the Turner River watershed. A series of plugs and culverts are currently being installed, as defined in Report M-621 (Rosendahal and Sikkema, 1981), in the local canals to prevent the rapid drainage of fresh waters and to provide the local waters access into the natural flow regime.

ALKALINITY

The geometric mean for alkalinity concentrations for all BICY monitoring stations in 1988 was 162 mg/l, Figure C3. As seen with specific conductivity, alkalinity values vary between the wet and dry seasons. Figure B3 shows that lower alkalinity values occurred during the wet months. Alkalinity is the measure of the ability of water to neutralize acids. Since the wet season increases the depth of the local surface waters, dissolved calcium is diluted, thus reducing the alkalinity of the waters. As the surface waters recede during the dry months, the increased concentration of calcium ions increases the alkalinity or buffering capacity of the waters. Figure A3 shows the variable alkalinity values at each BICY monitoring station for 1988. There were no alkalinity values below the Florida Department of Environmental Regulations (FDER) limit of > 20 mg/l in 1988, Table 3.

pH

A pH geometric mean of 7.34 was recorded for all monitoring stations in 1988, Figure C4. pH is a measure of the degree of acidity or alkalinity, with a range of 0 (acid) - 14 (basic), with 7 being neutral. Figure A4 shows the consistant pH geometric mean values, between 7.0 and 8.0, for each monitoring station in 1988. The stable values are attributed to the buffering capacity of the limestone bedrock in BICY. Although the precipitation in south Florida is slightly acid, average pH = 5.3 (Kunkle et al., 1987), the well-buffered surface waters in BICY neutralize the precipitation. Fairly stable pH values are also shown between the wet and dry months in 1988, Figure B4. Relatively lower pH values were detected during the wet months of June, July and August due to the compounding effect of the slightly acid precipitation recharge.

The FDER limit for pH states that pH shall not vary more than one pH unit above or below background levels within the 6.0 - 8.5 range, Table 3. Background pH values will vary slightly for each sampling site due to the diverse ecosystems located throughout the Preserve. Organic acids found in marsh systems and bogs will show a relatively lower pH background value than an open prairie system with a thin organic layer overlying limestone. There were no pH values that exceeded the FDER limit. The 1988 geometric mean for each sampling station was used as the background value for that specific monitoring station.

DISSOLVED OXYGEN

The geometric mean for dissolved oxygen concentrations for all BICY monitoring stations in 1988 was 3.39 mg/l, Figure C5. Dissolved oxygen concentrations are quite variable because of biological activity, water temperature, and discharge. Generally

WATER QUALITY STANDARDS OF THE FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

	Class III Water (1)	General Criteria For Any Surface Water (2)
Dissolved Oxygen	≥5.0 mg/l	Daily and seasonal fluctuations shall be maintained
Turbidity	–	Not to exceed 29 NTU's above background
pH	Shall not vary more than one unit above or below background (within 6–8.5 range)	Same as Class III
Alkalinity (as $CaCO_3$)	≥20 mg/l	None
Specific Conductance	–	Not increased >100% above background (If background is <500 umhos/cm) Not increased >50% above background (If background ≥500 umhos/cm) Maximum 5,000 umhos/cm when background is ≥500 and <5,000 umhos/cm
Ammonia (unionized)	≤0.02 mg/l	None

Nutrients 17–3.011(11)

Particular consideration shall be given to the protection from nutrient enrichment of those waters presently containing very low nutrient concentrations: Less than 0.3 mg/l Total Nitrogen or less than 0.04 mg/l Total Phosphorus.

	Class III Water (1)	General Criteria For Any Surface Water (2)
Arsenic	None	≤50 ug/l
Cadmium	0.8 µg/l hardness <150 mg/l, 1.2 µg/l in harder waters	None
Chromium (total)	None	≤50 ug/l after reasonable mixing.
Copper	≤30 ug/l	≤500 ug/l
Iron	≤1.0 mg/l	None
Lead	≤30 ug/l	≤50 ug/l
Mercury	0.2 ug/l	None
Nickel	≤100 ug/l	None
Zinc	≤30 ug/l	≤1.0 mg/l

1. Class III waters are defined as suitable for recreation, propagation, and maintenance of healthy well-balanced populations of fish and wildlife.

2. Any violation of these criteria constitutes pollution.

TABLE 3

oxygen levels are lowest at dawn and gradually increase, due to increased photosynthesis through the day, until late afternoon when they begin to decline. The ability of water to hold oxygen decreases with increases in water temperature. Figure B5 shows lower dissolved oxygen values (geometric mean) during the warmer months of April through October and progressively higher values during the cooler months of March through November. Also it should be noted that there is an increase in the dissolved oxygen during June, Figure B5. This is probably attributed to the increased flow rates in BICY waters which result from increased precipitation during the rainy season, Figure F1.

The FDER limit for dissolved oxygen should not be less than 5.0 mg/l, Table 3. During 1988, 65% of the samples collected in BICY were less than the 5.0 mg/l limit. The low dissolved oxygen levels result from lack of photosynthesis and a relatively high respiration rate associated with decomposition processes. At many sampling stations the dense vegetation prevents sunlight from penetrating into the surface waters. The plants closest to the surface obtain sunlight and produce oxygen, while the plants that are shaded respire and consume oxygen. This reduces the dissolved oxygen concentration in the local waters. Dissolved oxygen levels in Corkscrew Swamp, located in south Florida, ranged from 14.6 mg/l in a shallow open marsh to 0.0 mg/l in the middle of the water column of a stagnant pond completely covered with floating plants (Duever et al., 1986). This is similiar to the maximum and minimum dissolved oxygen values of 12.86 mg/l and 0.34 mg/l recorded in BICY in 1988, Figure C5. It is evident that the FDER limit of 5.0 mg/l is not an accurate standard for wetland areas in south Florida. According to Section 17-3.016(3)(g) of the Florida Administrative Code, dissolved oxygen levels that are attributed to natural background conditions may be established as alternative dissolved oxygen criteria for a specific water body. The determination of an alternative criteria is outlined in Section 17-3.031(2)(a)-(d), F.A.C., and should be addressed in the near future.

NUTRIENTS

None of the nutrient parameters sampled in 1988 exceeded the FDER limits, Table 3. The nutrients that were sampled during 1988 were nitrite (NO2), nitrate (NO3), unionized ammonia (NH3), and orthophosphate (OPO4). Nitrite, nitrate and unionized ammonia were less than 1.0 mg/l, Figure E1. Orthophosphate had a maximum concentration of 2.0 mg/l. Major sources of nitrogen include domestic sewage effluents and agricultural fertilizers. Unionized ammonia is found in wastewater effluents and sources for orthophosphate include phosphate fertilizers and various forms of organic pollution (Fetter, 1980). Growing plants assimilate nitrogen and ammonium ions and convert them to protein. Thus a correlation with these parameters and plant growth exists. Phosphates are also one of the major nutrients required for plant nutrition. In high concentrations, excessive

or nuisance algal growths and other aquatic plants begin to proliferate. This can contribute to the process of cultural eutrophication in which dissolved oxygen concentrations are reduced below background levels.

METALS

The trace metals sampled in 1988 were arsenic, cadmium, copper, lead, mercury and zinc, Figure E1. Two of the trace metals, lead and mercury, exceeded the FDER limit as defined in Table 3. Lead had a value of 0.04 mg/l at station A4, exceeding the FDER limit by 0.01 mg/l. Since the detection limit for the lead analysis is 0.01 mg/l and all other lead samples have shown concentrations below the detection limit, it is premature to make any assumptions toward this anomaly. A value of 0.0006 mg/l was recorded for mercury at station A1. This exceeded the FDER limit by .0004 mg/l. Station A1 is located off an active oil pad in the Preserve, thus the potential for metal contamination exists. Again, the rest of the samples collected in 1988 for mercury were below the detection limit of 0.0002 mg/l. High concentrations of mercury (2.0 - 4.0 mg/l) have recently been found in fish collected from the Everglades. Water quality monitoring conducted by Collier County Florida in 1987, reported exceedences for mercury at all 12 stations sampled (Kirby et al., 1987). The sources for these high mercury levels at this time are unclear.

OTHER PARAMETERS

The other parameters sampled in 1988 were calcium, chloride, magnesium and sodium, Figure E1. Calcium concentrations ranged from 10.7 mg/l to 89.0 mg/l. Calcium in water decreases the toxicity of many chemical compounds to a variety of fish (Flora et al, 1984). Chlorides ranged from 11.0 mg/l to 118 mg/l, which is representative for fresh water systems. Magnesium ranged from 1.1 mg/l to 17.0 mg/l. Only small quantities of magnesium are found in local limestone, so fresh water concentrations are generally low (Duever et al., 1986). Sodium ranged from 6.0 mg/l to 54.0 mg/l. Duever et al., 1986, reported sodium concentrations as high as 12,800 mg/l in areas affected by salt water.

PRECIPITATION

A graphical summary of the monthly precipitation for 1988 is compared with the mean values for the respective months in Figure F1. Except for the precipitation recorded at Oasis Ranger Station during months of May, June, July and August, rainfall was below the 1978-1987 mean. The majority of the annual precipitation in 1988 fell from May through September. This reflects the normal distribution of the annual rainfall for south Florida.

RECOMMENDATIONS

Two major recommendations are apparent when the 1988 water quality data are reviewed. The first is the immediate need for sampling consistency as defined in the 1988 BICY water quality monitoring plan (Weeks, 1988). Inadequate depths of monitoring wells at stations A1, A2, A3, A4, A5, A9, and A10, produced an inconsistent sampling frequency for 1988 due to the lowering of the water table below the bottom of the wells during the dry months. Water levels can not be recorded and water samples can not be collected during this time. Increasing the depth of the wells by approximately three feet will solve this problem. The second recommendation is the need to survey stations A1, A2, A3 and A5 to NGVD so a common datum will exist between all monitoring stations. This will help to better define seasonal flow regimes and correlate water levels with various chemical parameters. Water levels are currently being recorded by Stevens Type F recorders at seven stations with temporary datums being used until the monitoring sites are surveyed. Three stations are not recording water levels due to vandalism in 1988. Repairs have been made at two of the stations and recorders will be in operation by April, 1989.

It will be necessary in the near future to increase the number of monitoring stations in the Preserve. Deep Lake Strand is a large flow system in Big Cypress that is not being monitored. The installation of a monitoring station is needed in this hydrologically sensitive area. In 1988, the Preserve was expanded by 146,000 acres. The original Preserve boundary of 570,000 acres enclosed most of a single watershed. Only eight percent of the Preserve's land was outside the Big Cypress watershed. The addition has increased BICY lands located outside the Big Cypress watershed by approximately 25 percent. This makes Mullet Slough the largest external flow system in the Preserve. Thus, external influences from agricultural development are expected to increase within the Preserve's boundaries. The need for expansion of the water quality monitoring network is obvious and will need to be addressed in 1989.

In addition to the hydrological information contained in this annual report, the 1989 Water Quality Report will begin making yearly comparisons between individual sites, Appendix D, and the Preserve as a whole, Appendix C.

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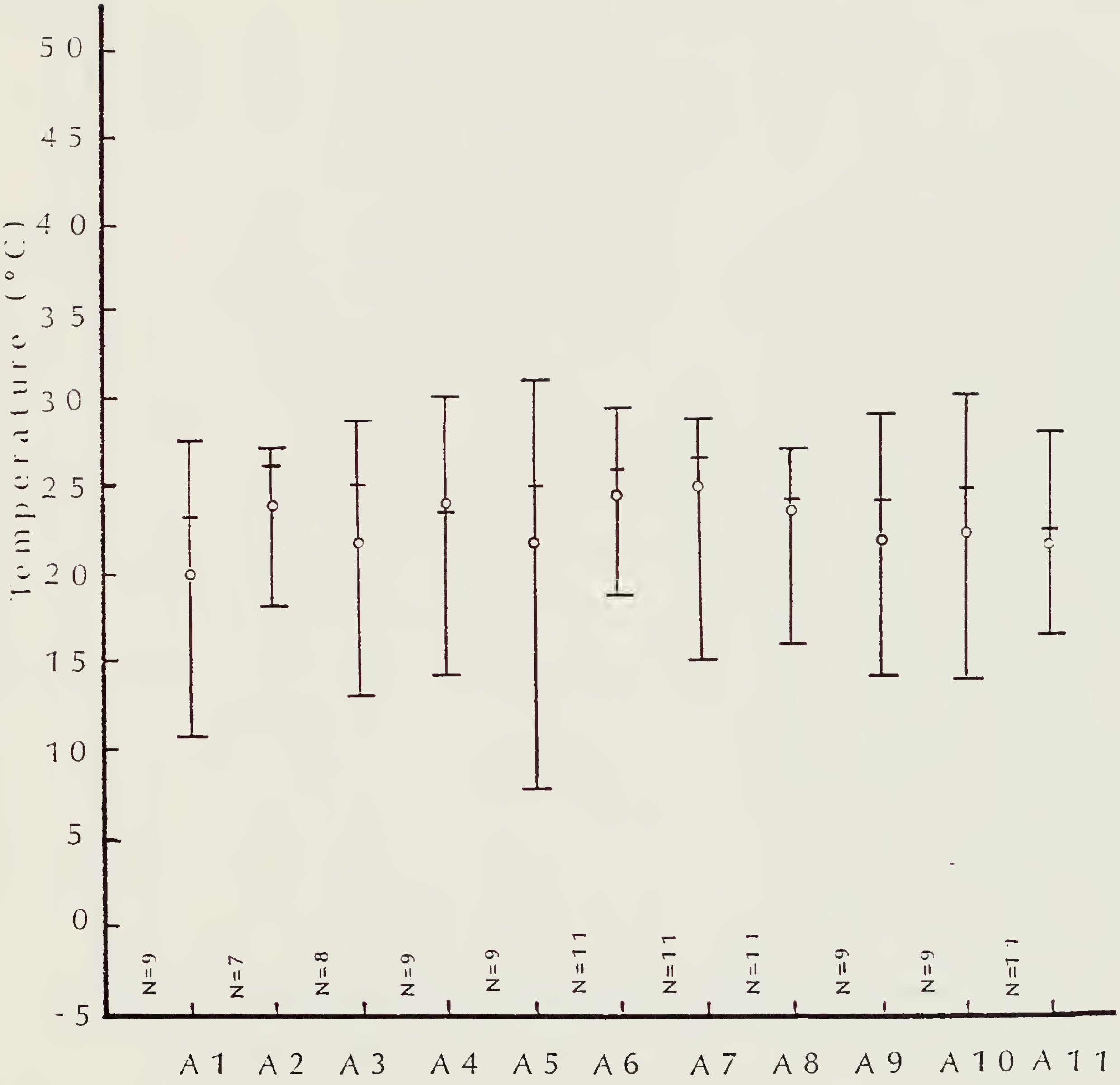
APPENDICES

APPENDIX A



TEMPERATURE - 1988

BIG CYPRESS NATIONAL PRESERVE

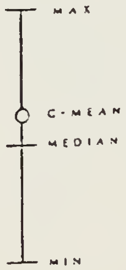
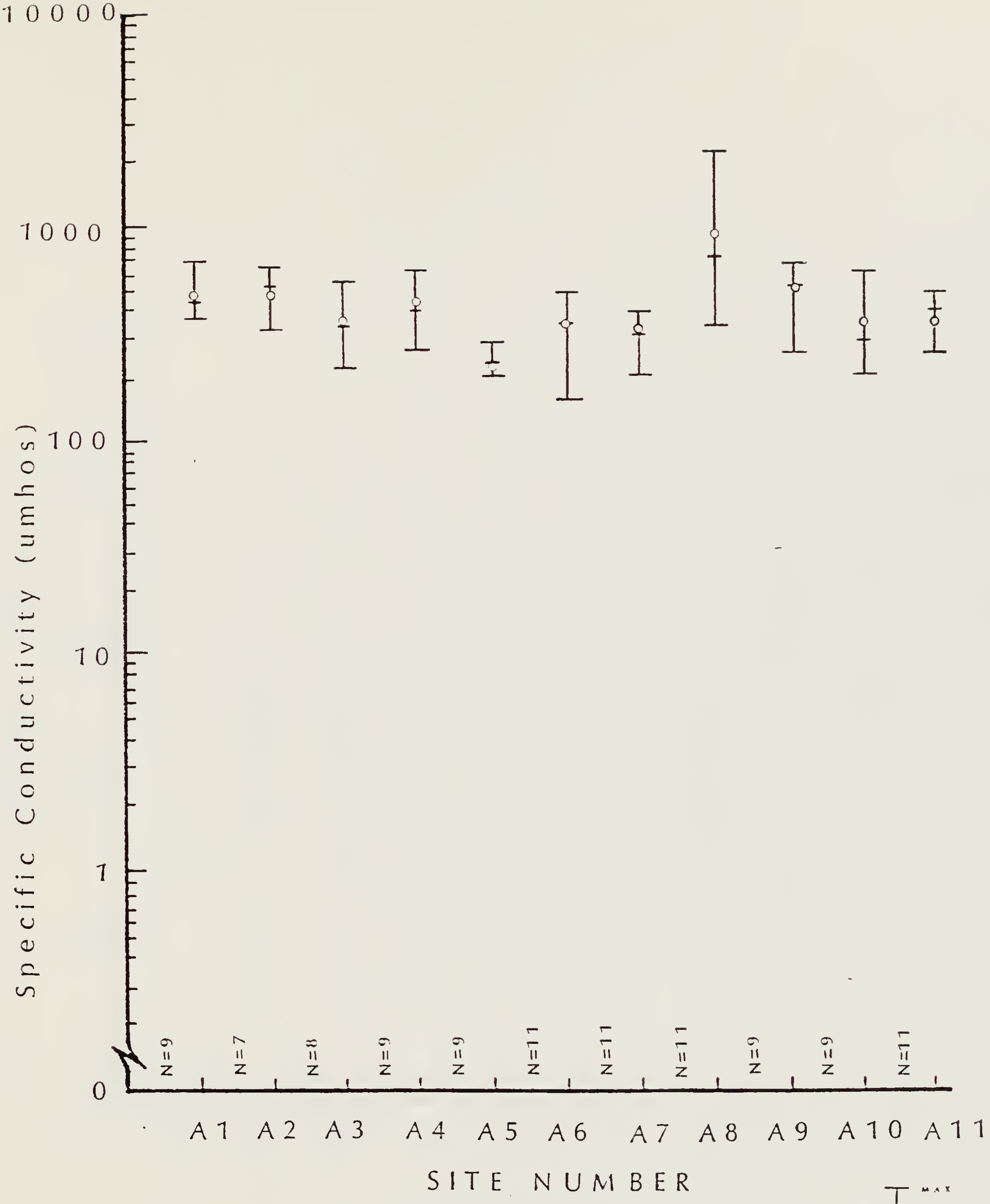


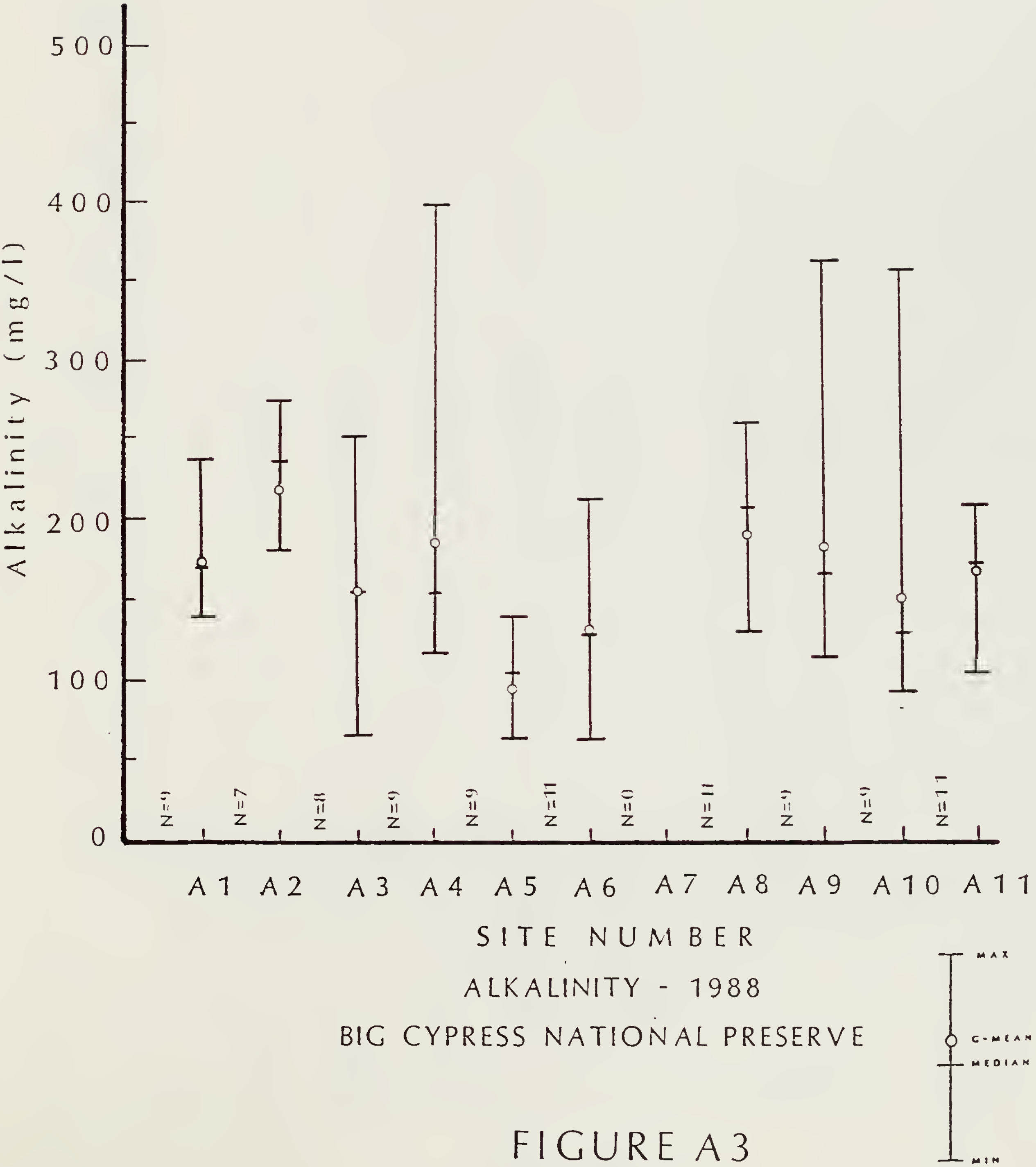
FIGURE A1



SPECIFIC CONDUCTIVITY - 1988

BIG CYPRESS NATIONAL PRESERVE

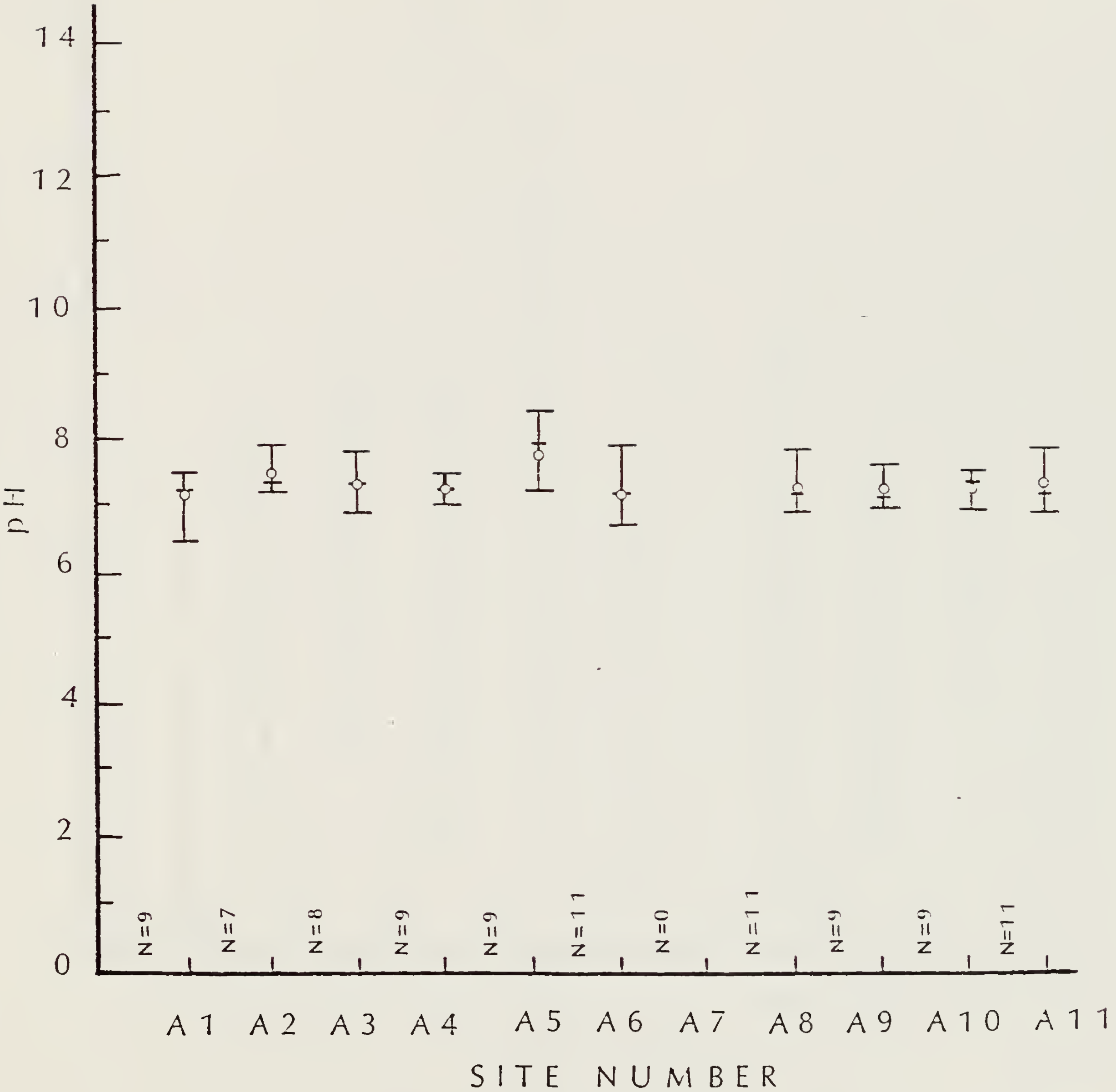
FIGURE A2



ALKALINITY - 1988

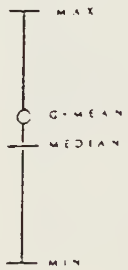
BIG CYPRESS NATIONAL PRESERVE

FIGURE A3



pH - 1988

BIG CYPRESS NATIONAL PRESERVE



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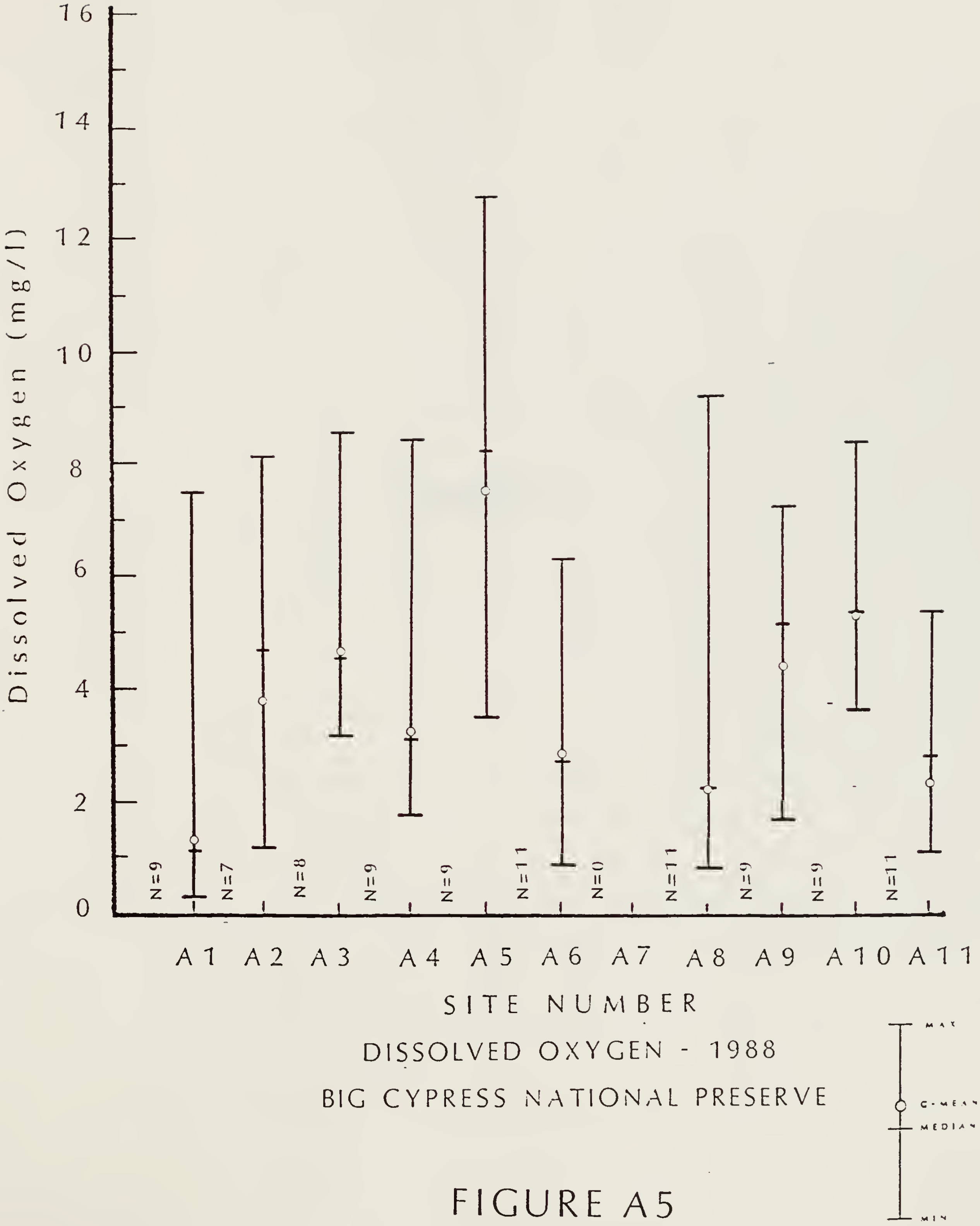
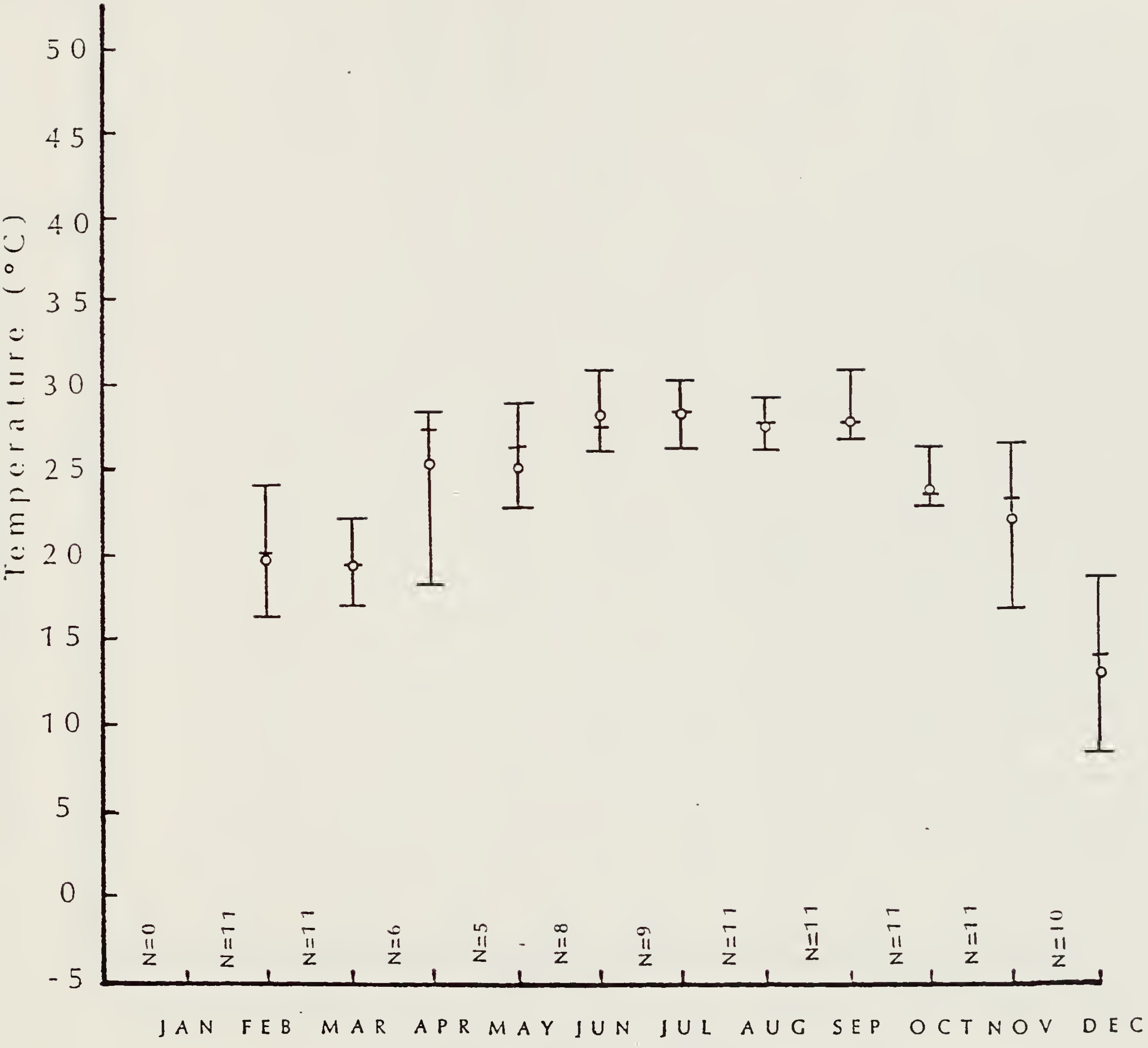


DISSOLVED OXYGEN - 1988

BIG CYPRESS NATIONAL PRESERVE

FIGURE A5

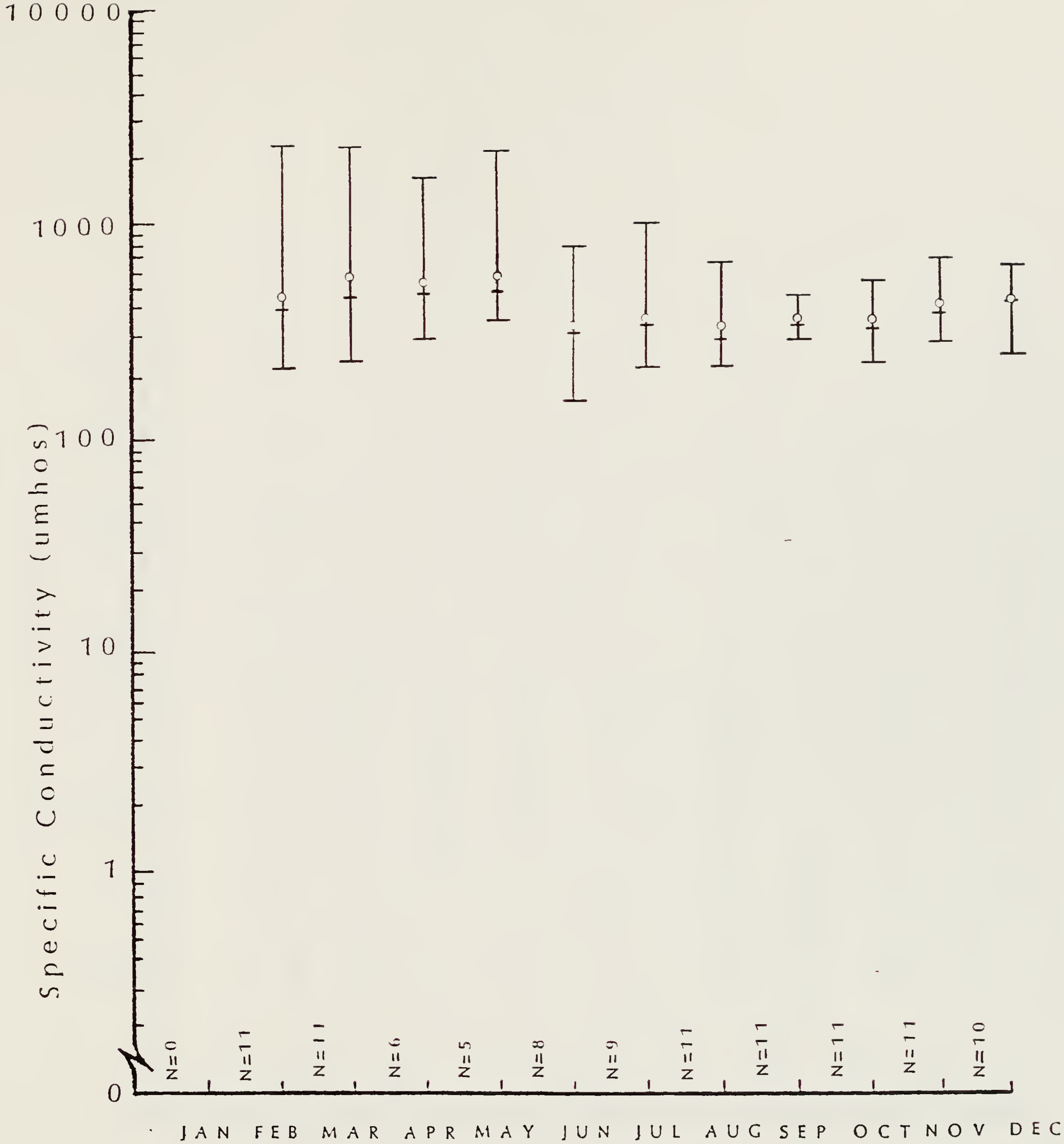
APPENDIX B



TEMPERATURE - 1988

BIG CYPRESS NATIONAL PRESERVE

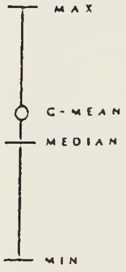
FIGURE B1

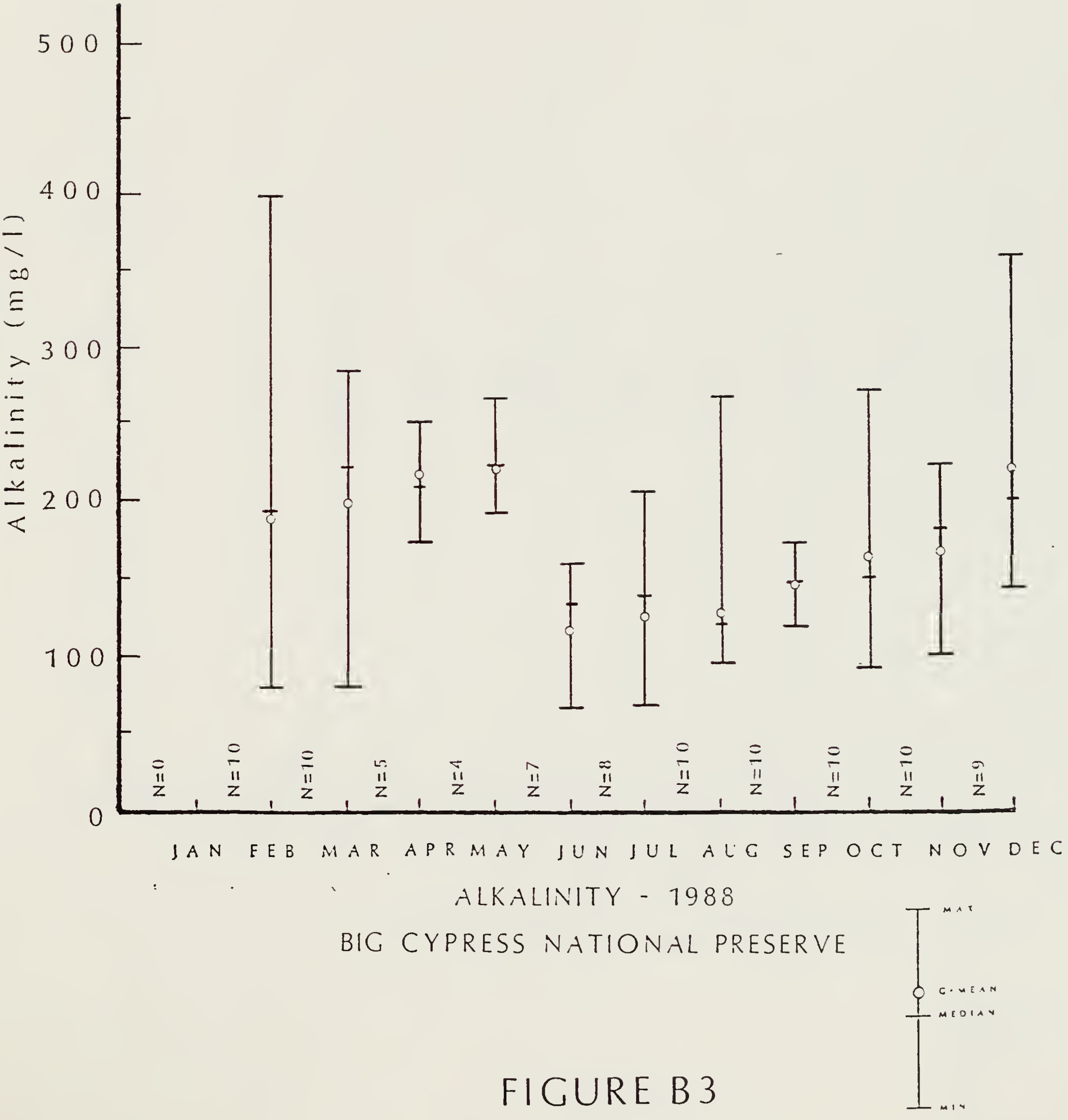


SPECIFIC CONDUCTIVITY - 1988

BIG CYPRESS NATIONAL PRESERVE

FIGURE B2

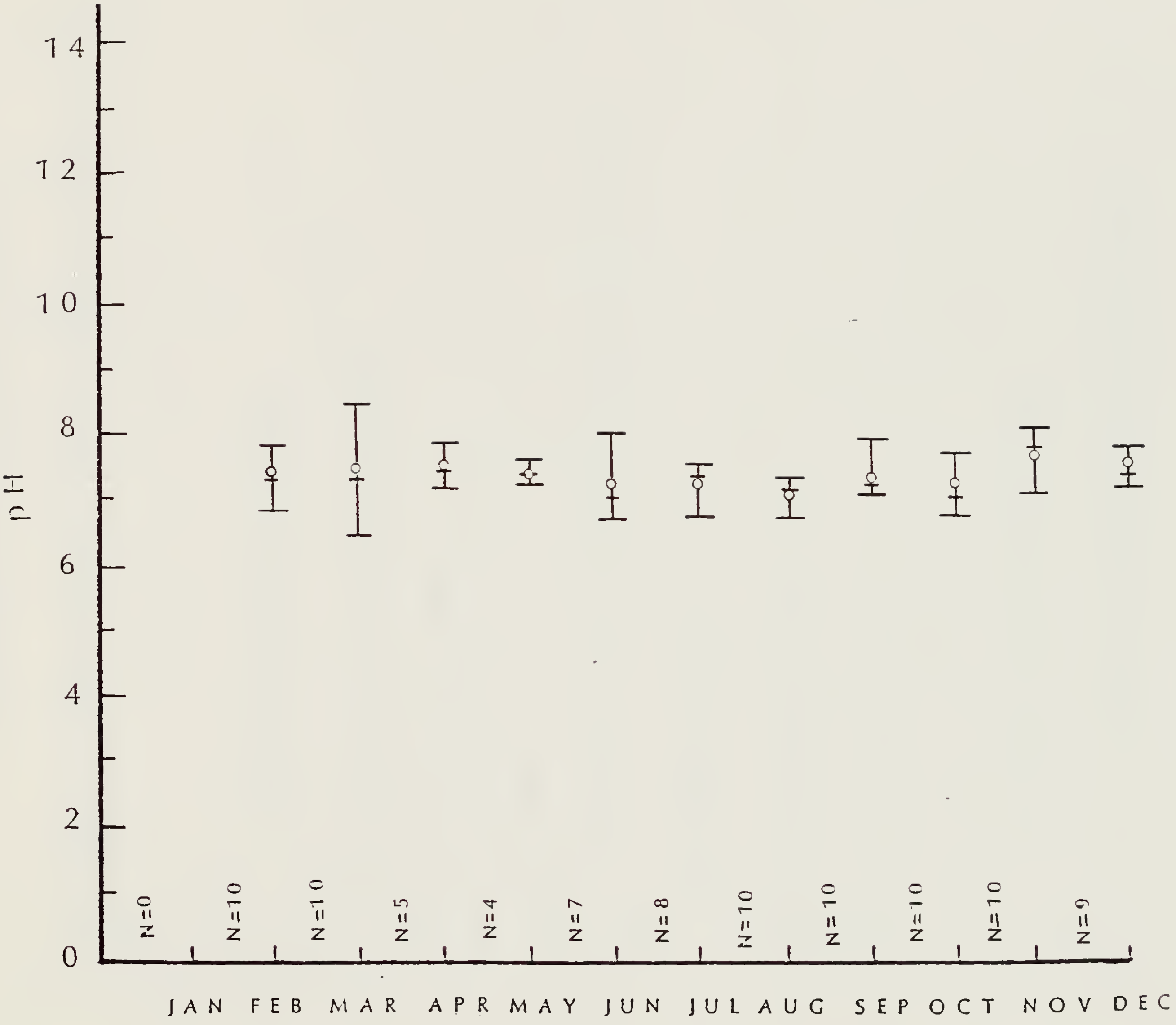




ALKALINITY - 1988

BIG CYPRESS NATIONAL PRESERVE

FIGURE B3



pH - 1988

BIG CYPRESS NATIONAL PRESERVE

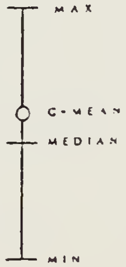
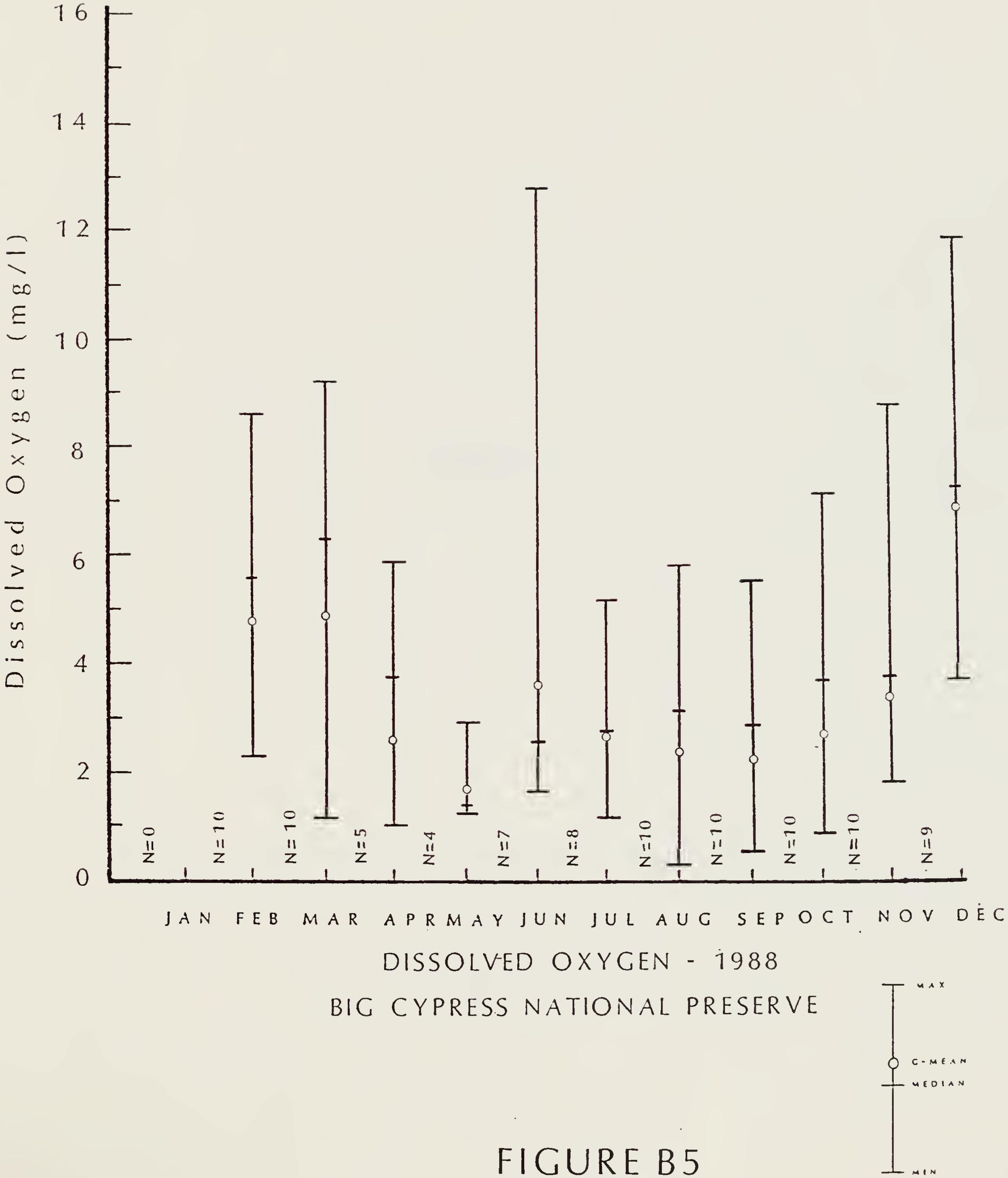


FIGURE B4

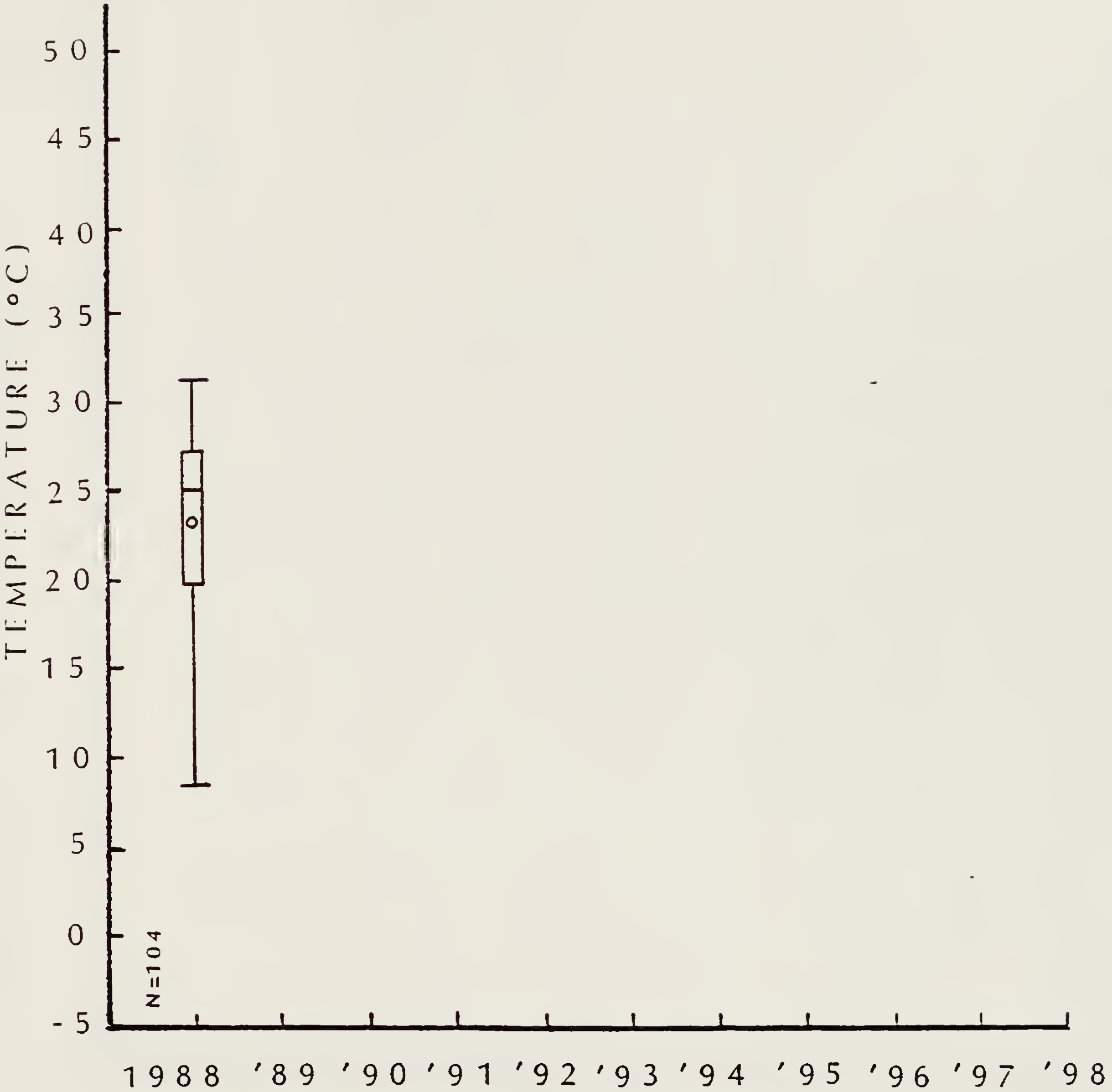


DISSOLVED OXYGEN - 1988

BIG CYPRESS NATIONAL PRESERVE

FIGURE B5

APPENDIX C



TEMPERATURE

BIG CYPRESS NATIONAL PRESERVE

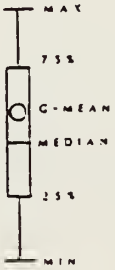
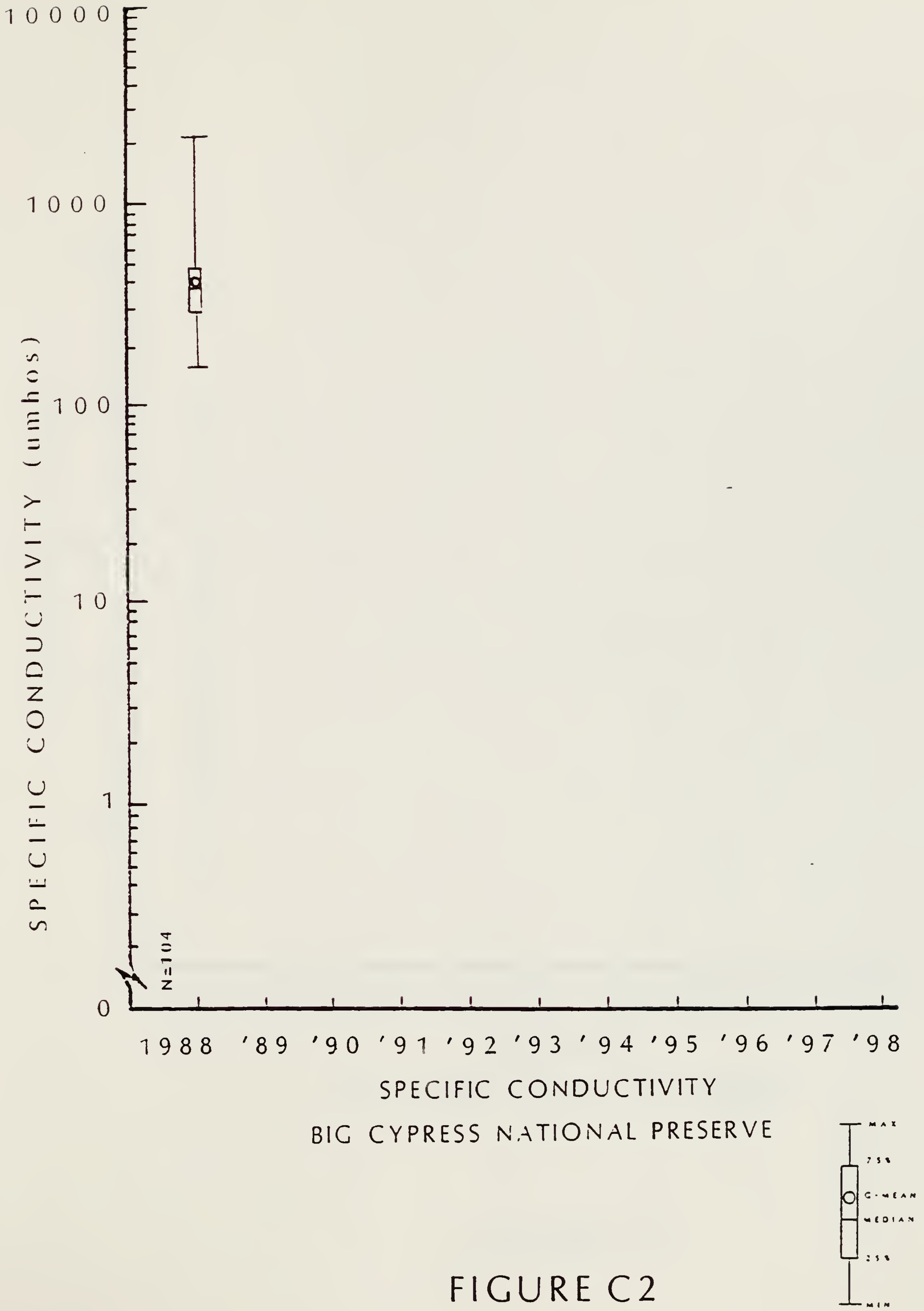
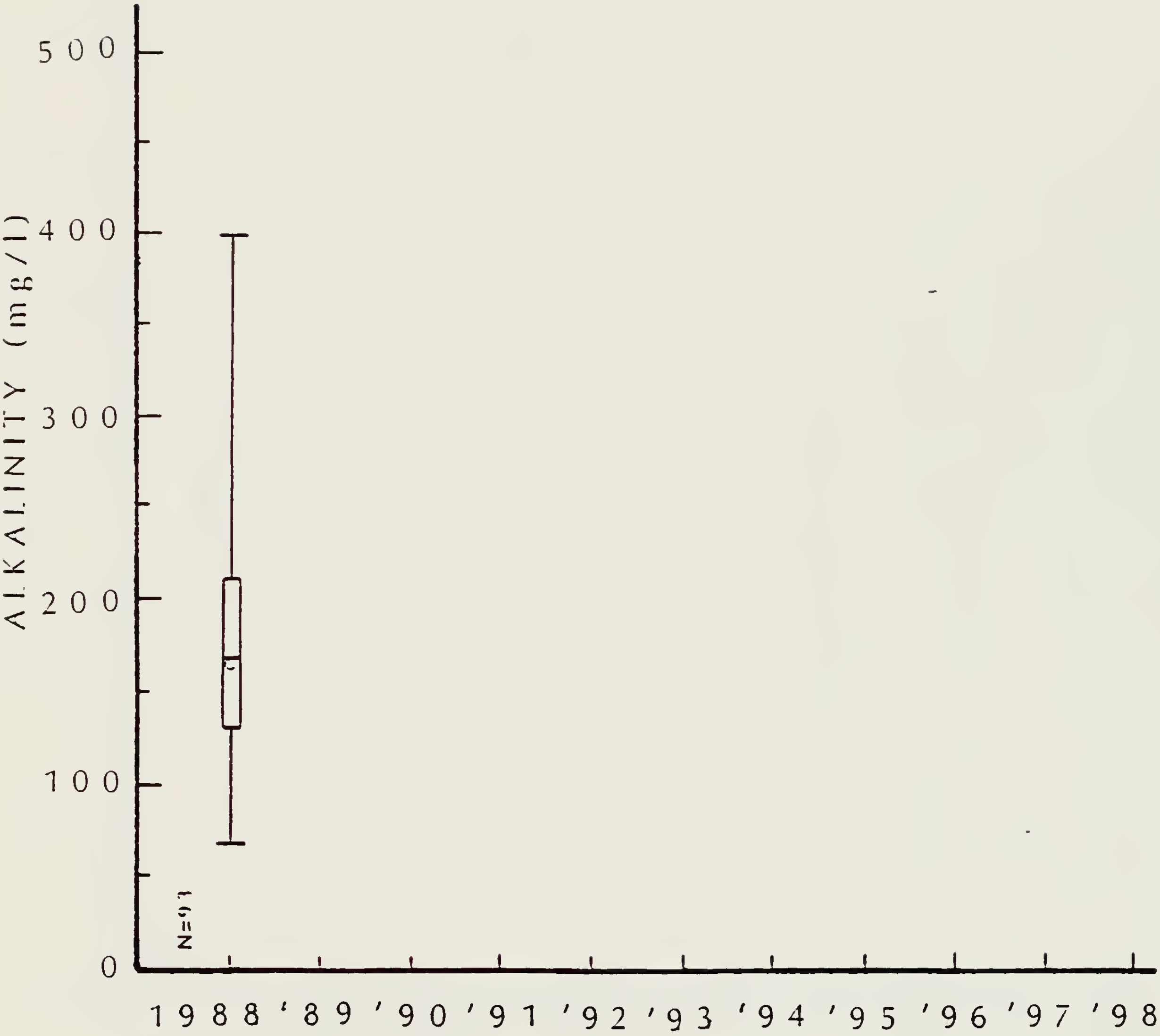


FIGURE C1



SPECIFIC CONDUCTIVITY
BIG CYPRESS NATIONAL PRESERVE

FIGURE C2



ALKALINITY
BIG CYPRESS NATIONAL PRESERVE

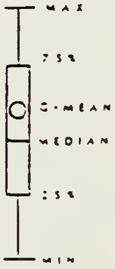
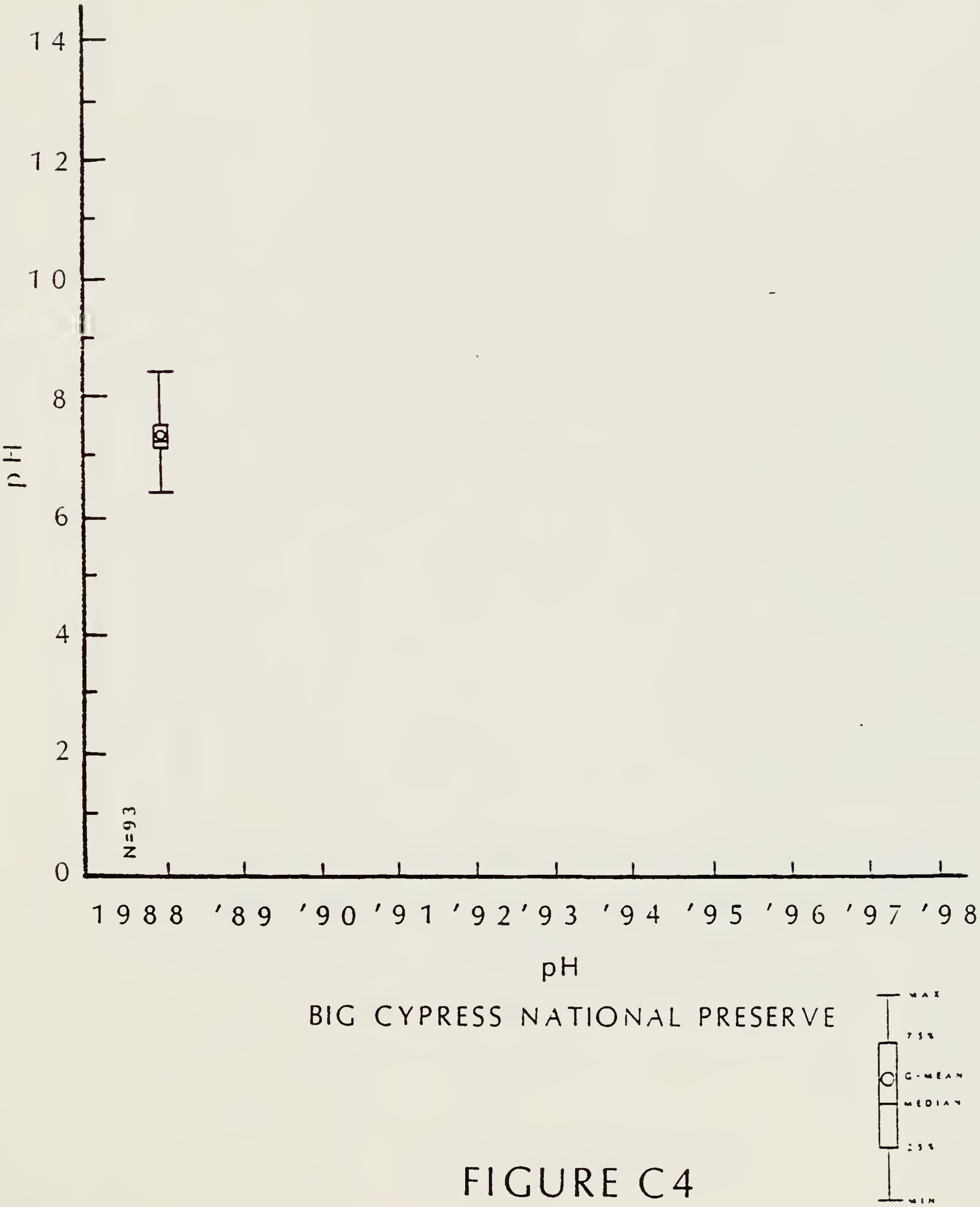


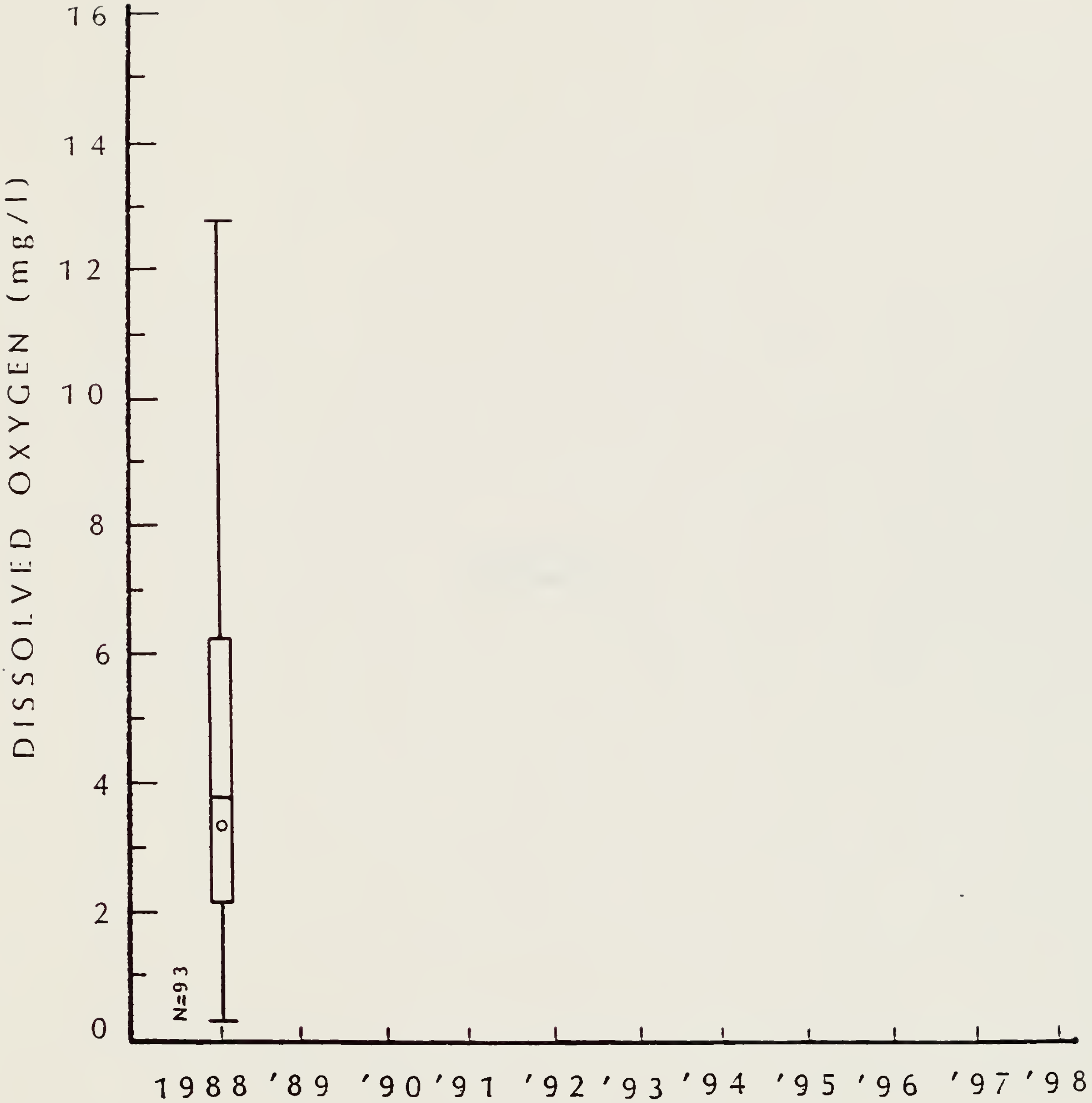
FIGURE C3



pH

BIG CYPRESS NATIONAL PRESERVE

FIGURE C4



DISSOLVED OXYGEN

BIG CYPRESS NATIONAL PRESERVE

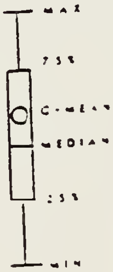
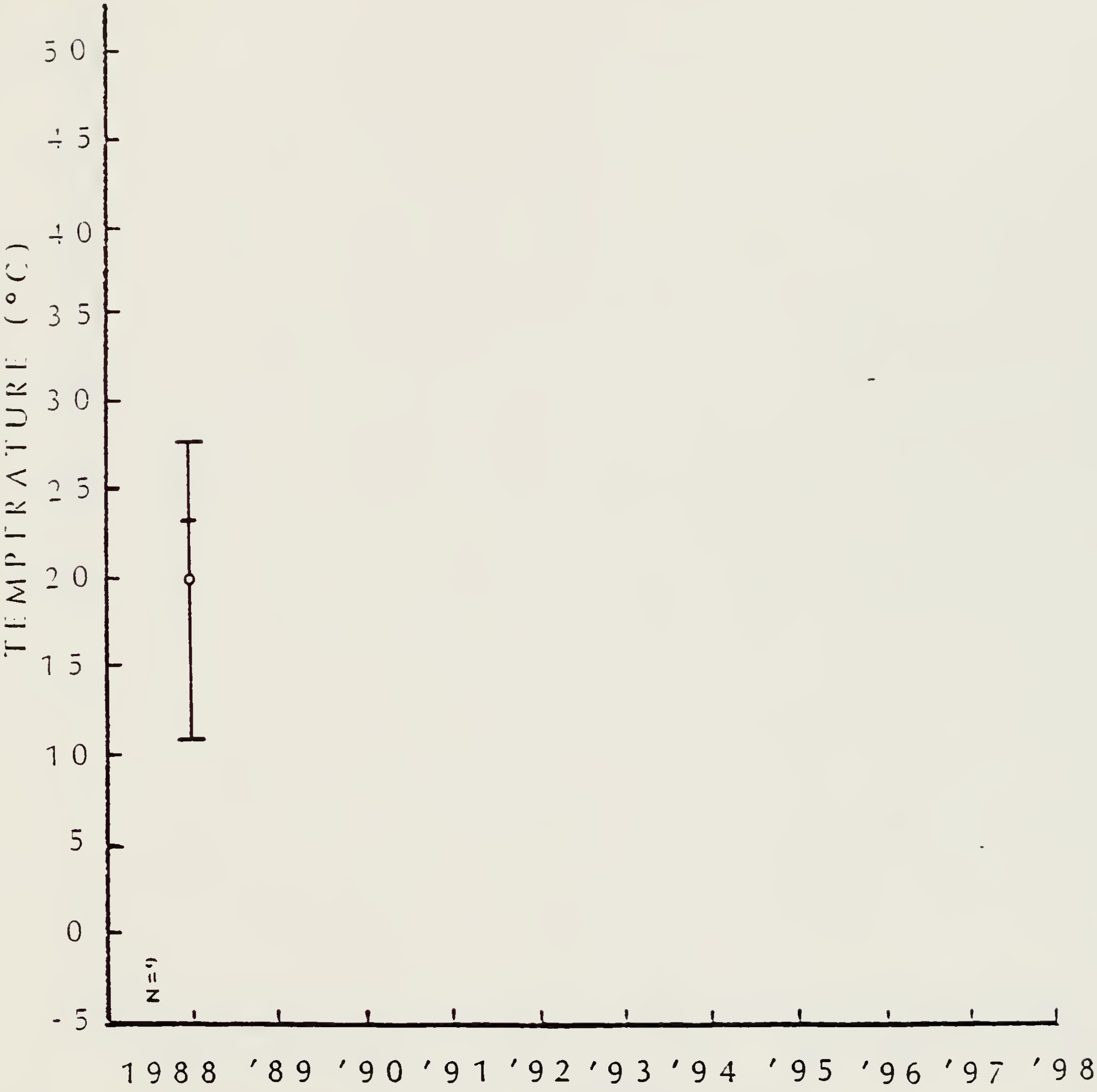


FIGURE C5

APPENDIX D



SITE A1 - TEMPERATURE

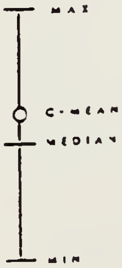


FIGURE D1

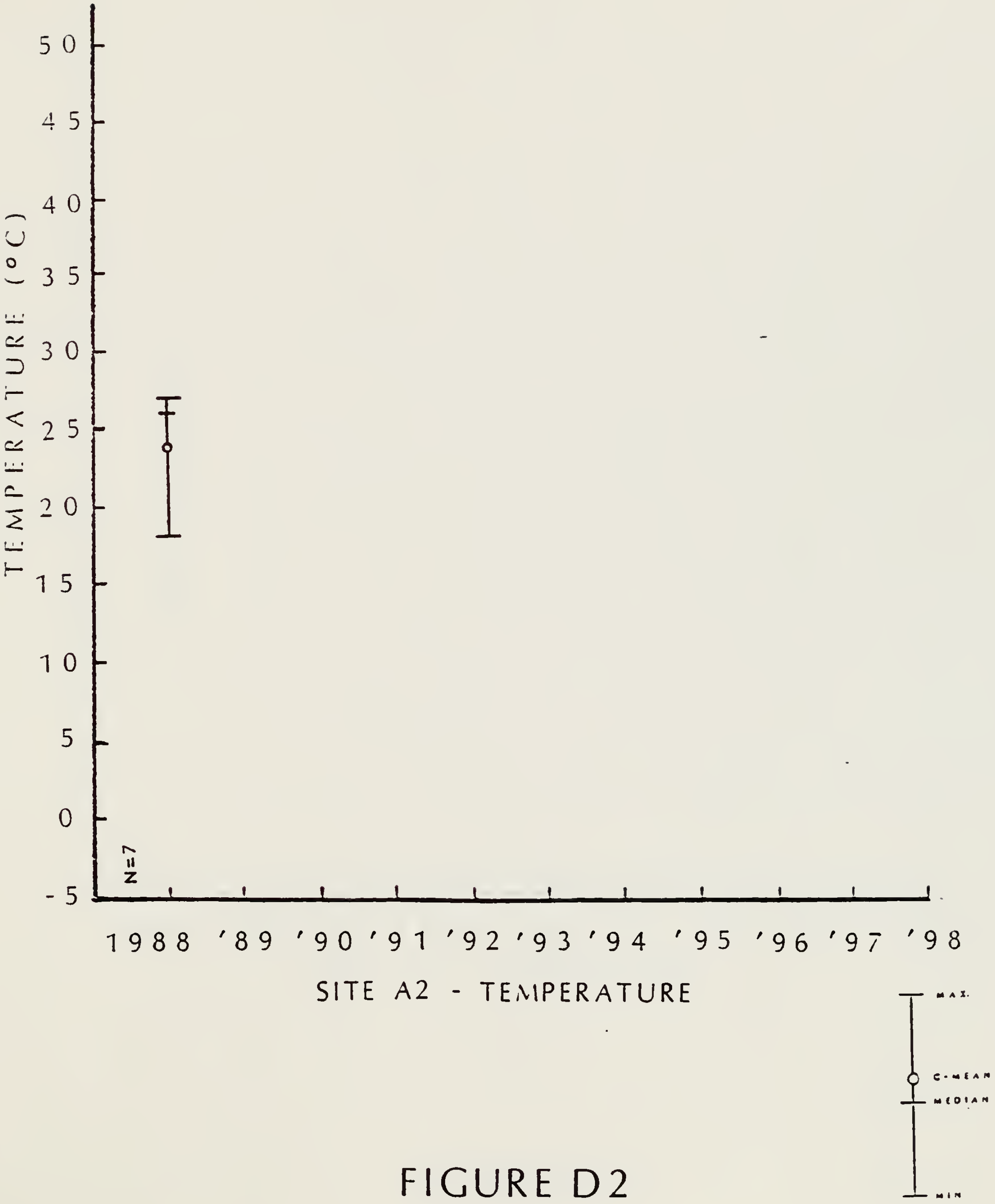
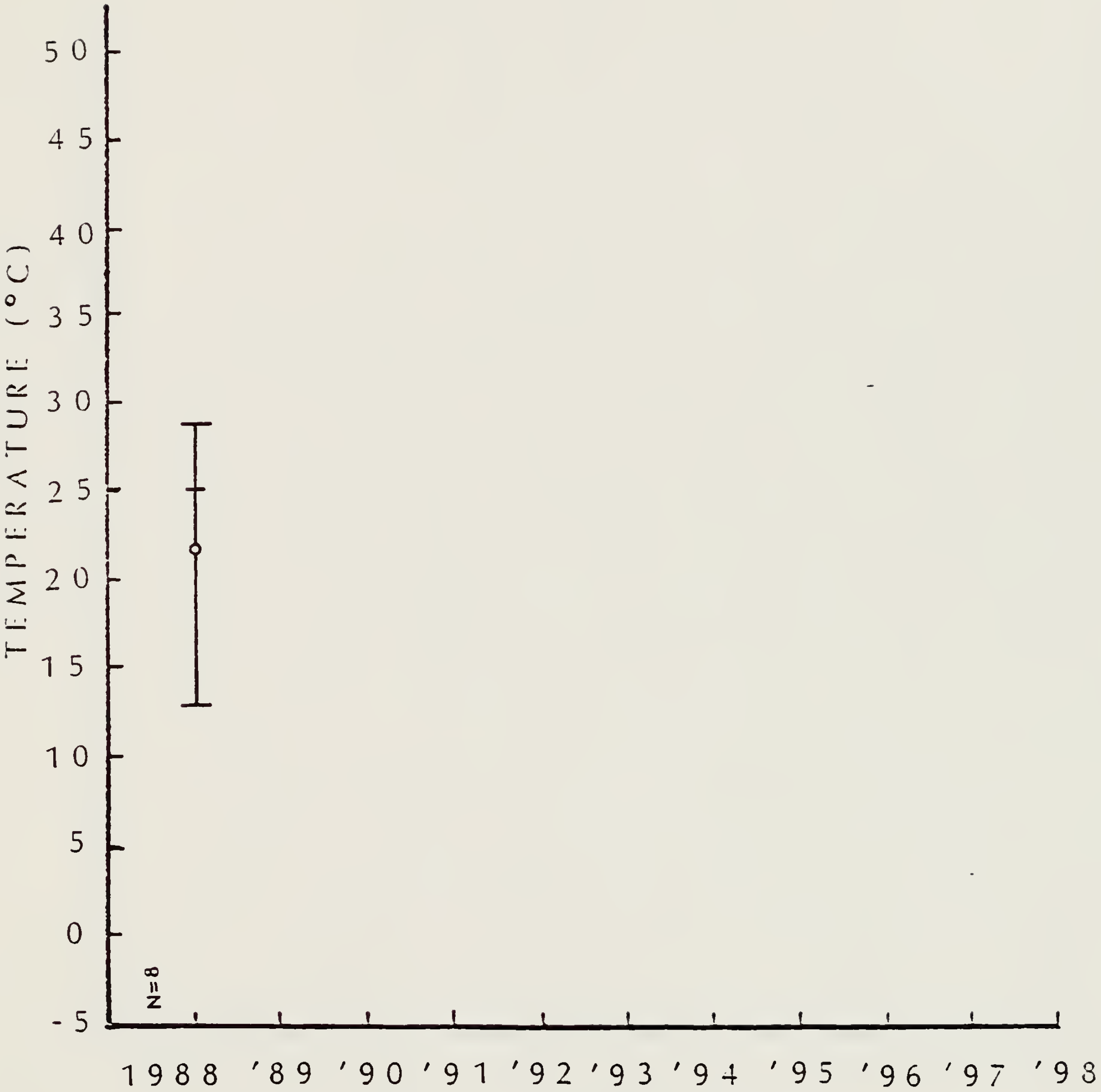

TEMPERATURE (°C)
50
45
40
35
30
25
20
15
10
5
0
-5
N=7
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A2 - TEMPERATURE
MAX.
G-MEAN
MEDIAN
MIN

FIGURE D2



SITE A3 - TEMPERATURE

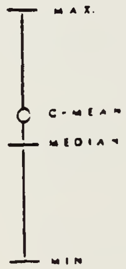
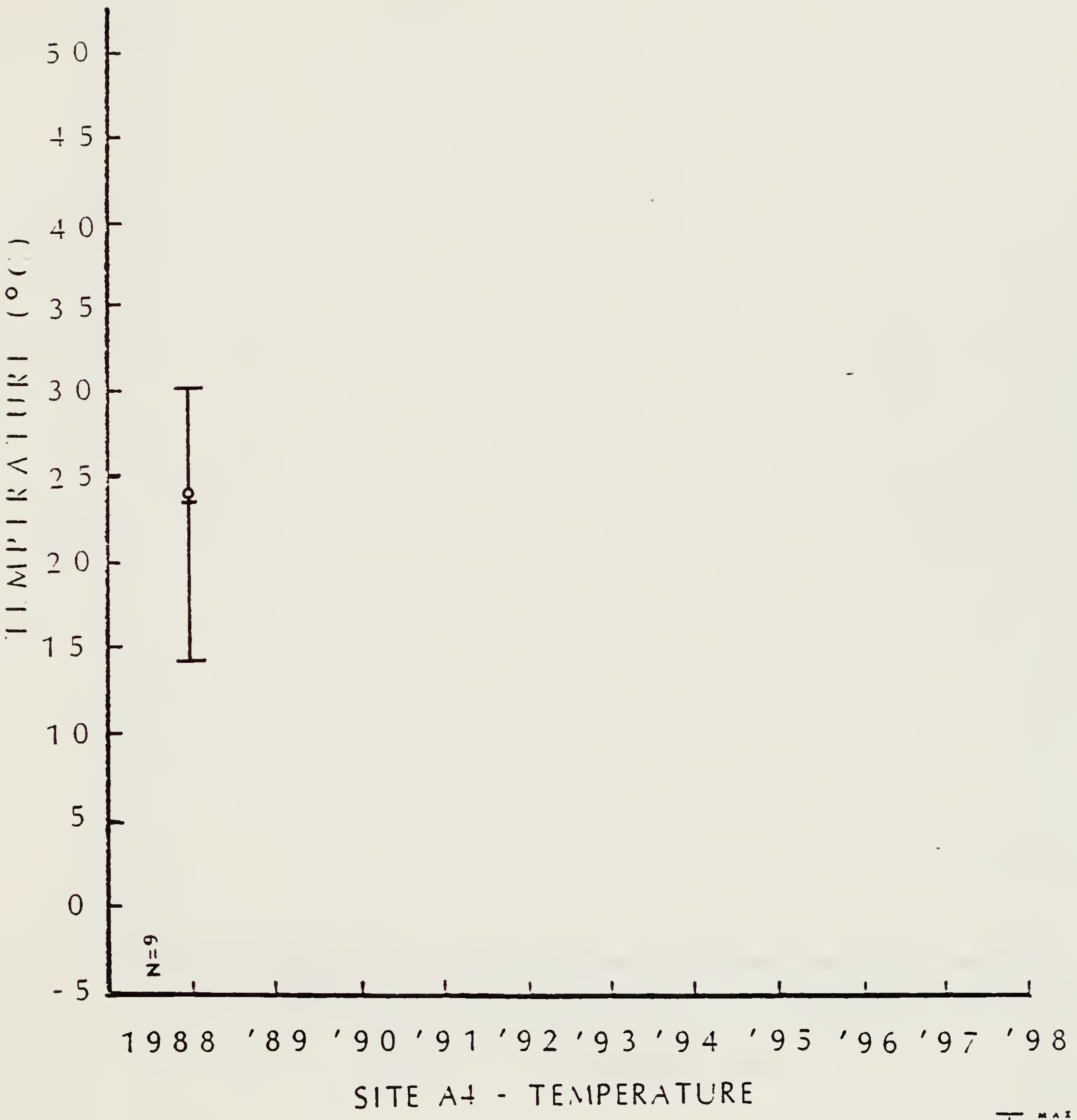


FIGURE D3


50
45
40
35
30
25
20
15
10
5
0
-5
TEMPERATURE (°C)
N=9
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A4 - TEMPERATURE

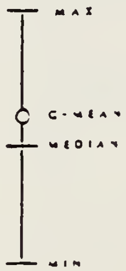
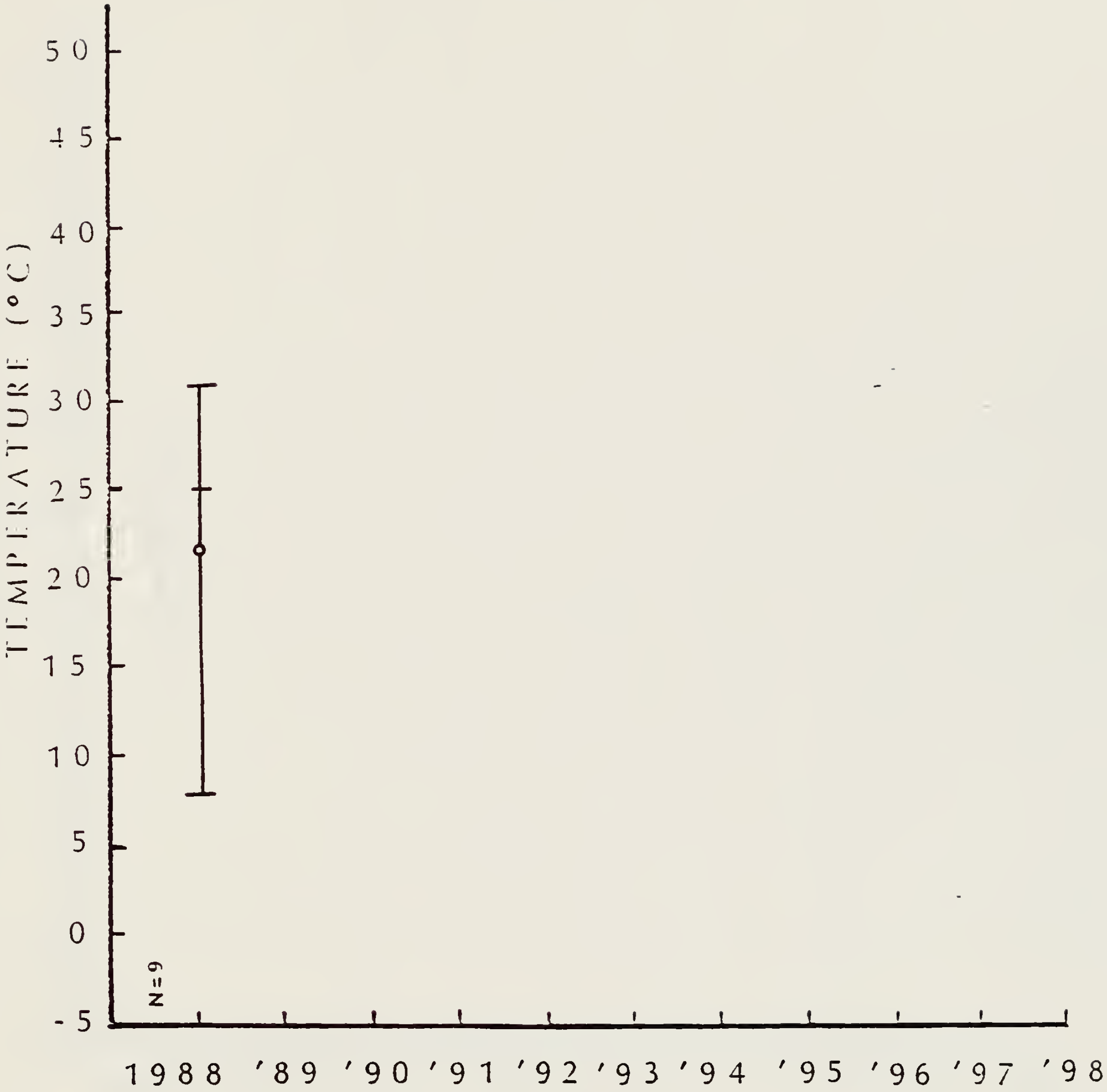

MAX
G-MEAN
MEDIAN
MIN

FIGURE D4



SITE A5 - TEMPERATURE

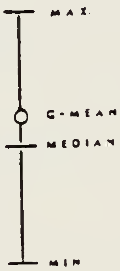
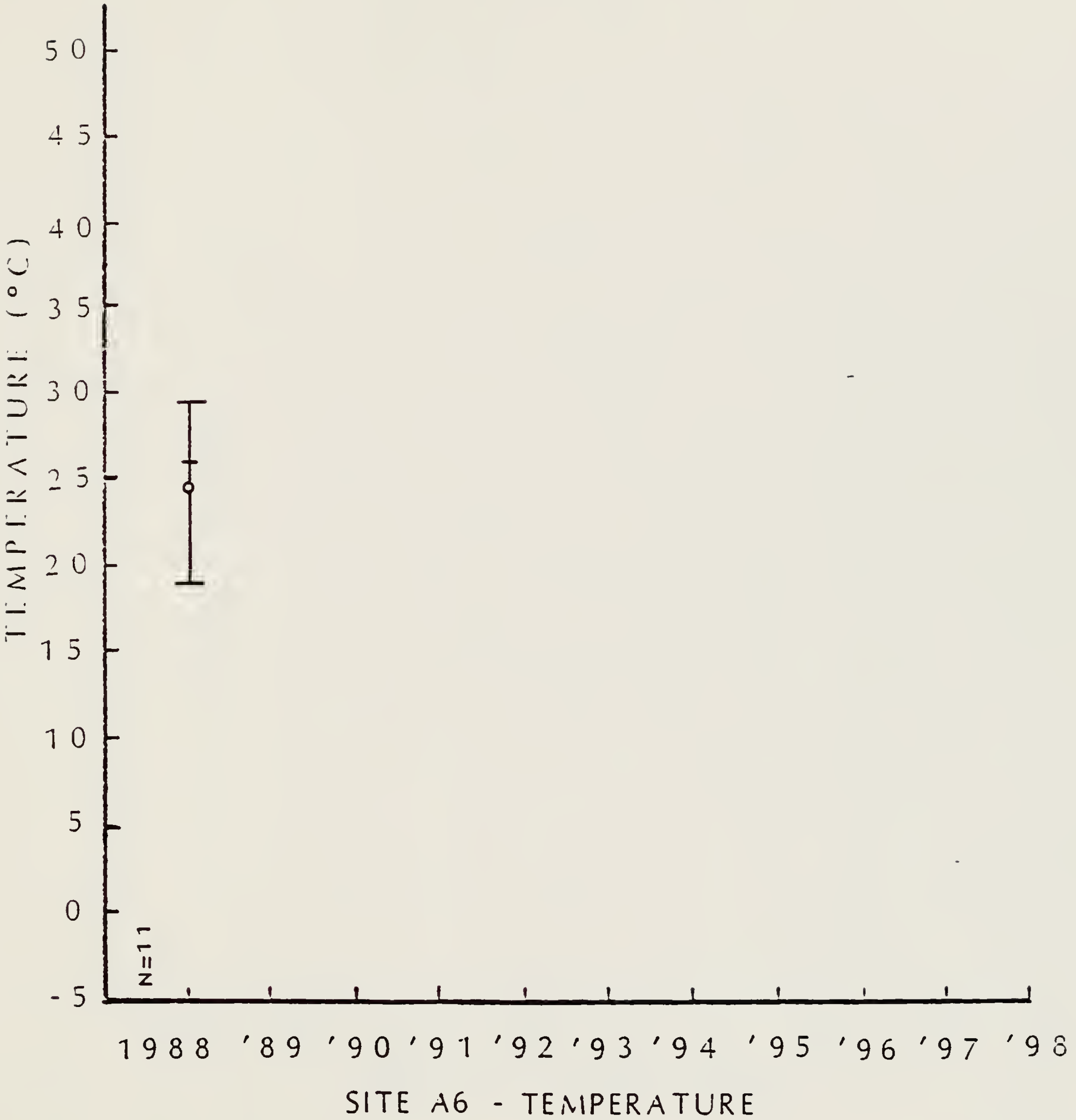


FIGURE D5


TEMPERATURE (°C)
50
45
40
35
30
25
20
15
10
5
0
-5
N=11
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A6 - TEMPERATURE

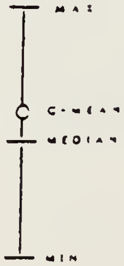
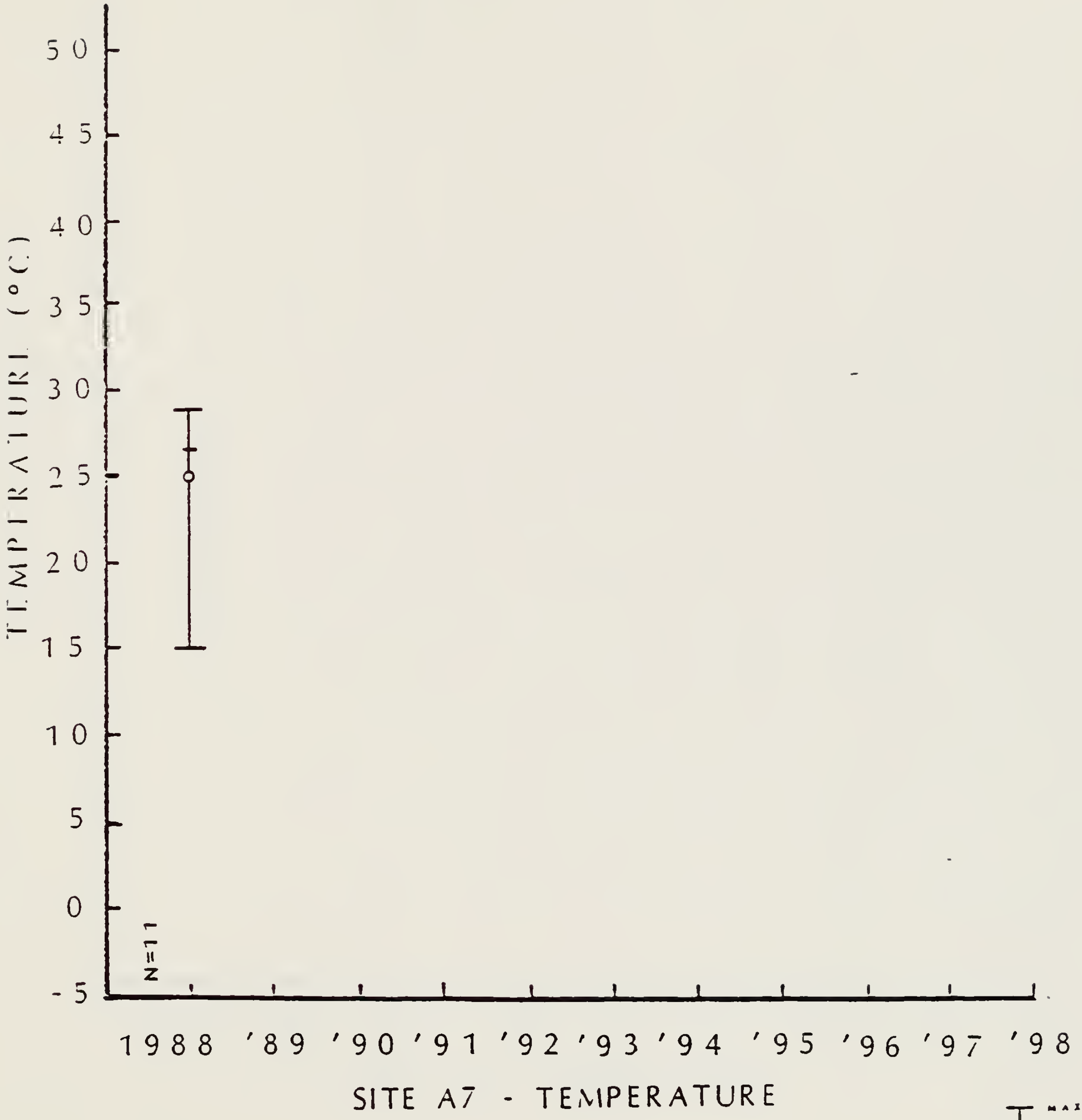

MAX
O-MEAN
MEDIAN
MIN

FIGURE D6


TEMPERATURE (°C)
50
45
40
35
30
25
20
15
10
5
0
-5
N=11
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A7 - TEMPERATURE

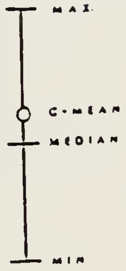
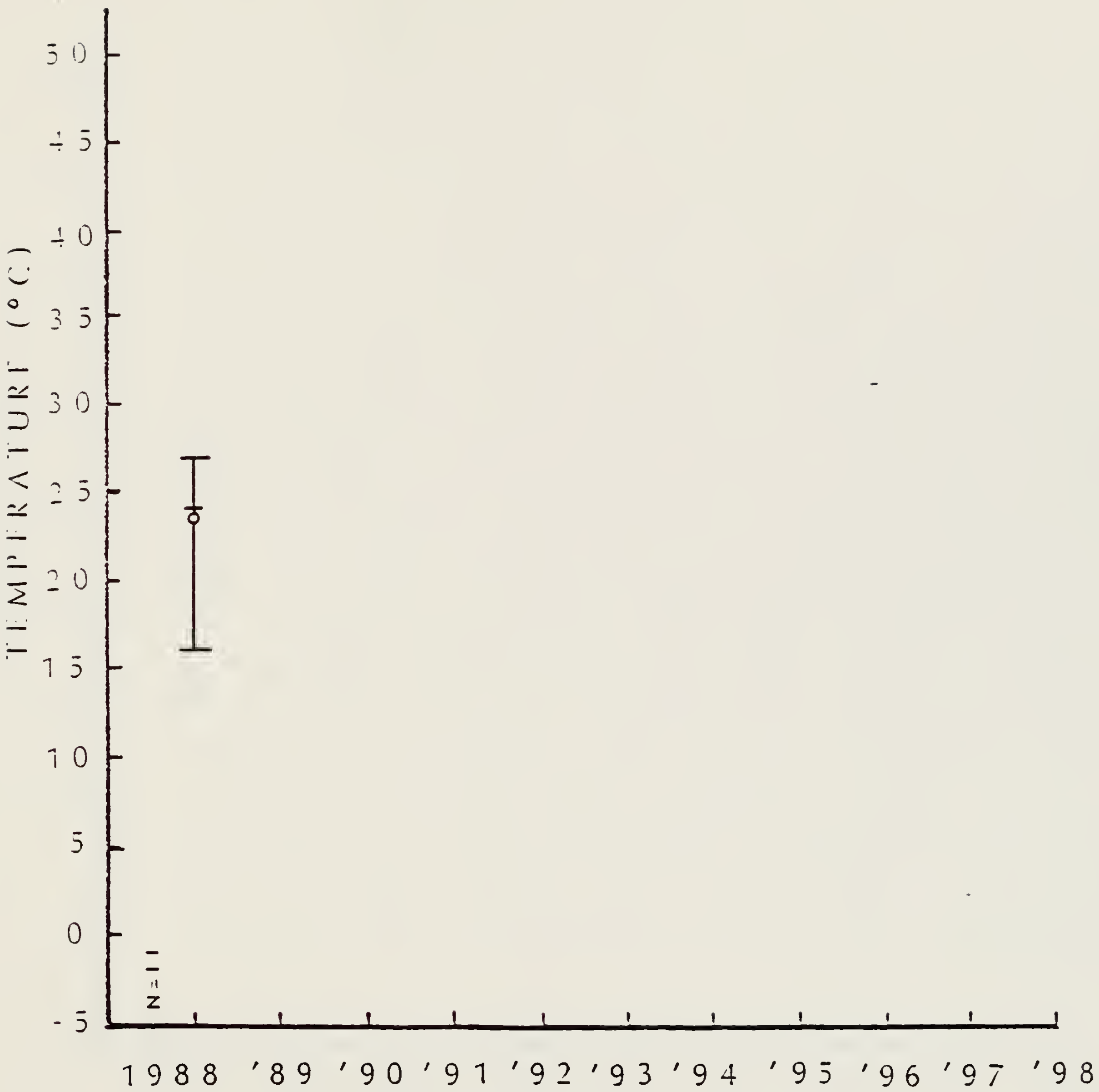

MAX.
C-MEAN
MEDIAN
MIN

FIGURE D7



SITE A8 - TEMPERATURE

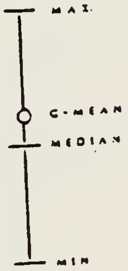
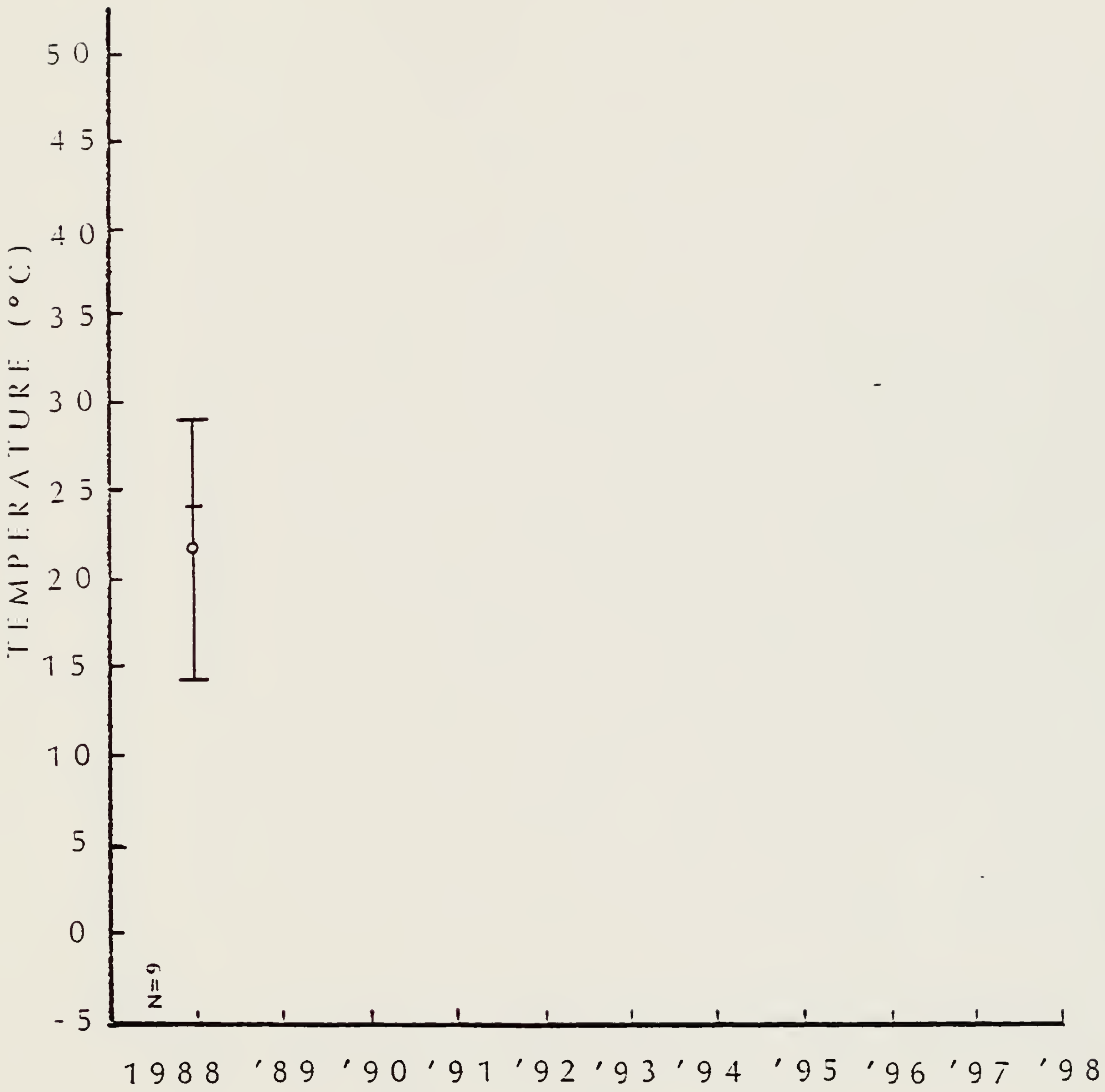


FIGURE D8



SITE A9 - TEMPERATURE

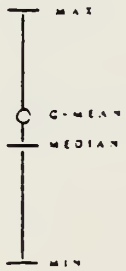
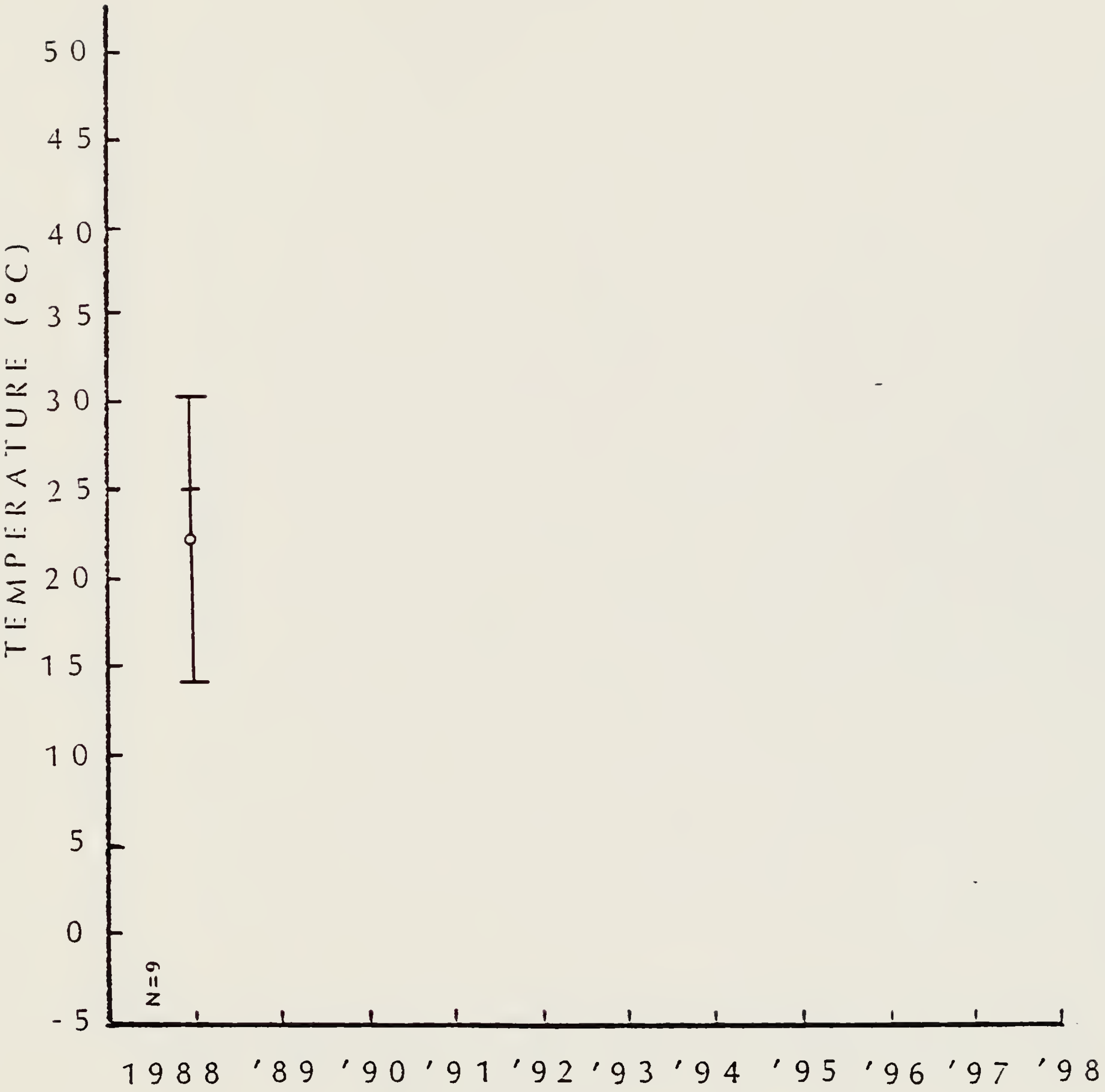


FIGURE D9



SITE A10 - TEMPERATURE

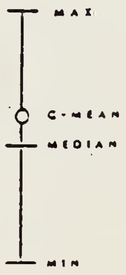


FIGURE D10

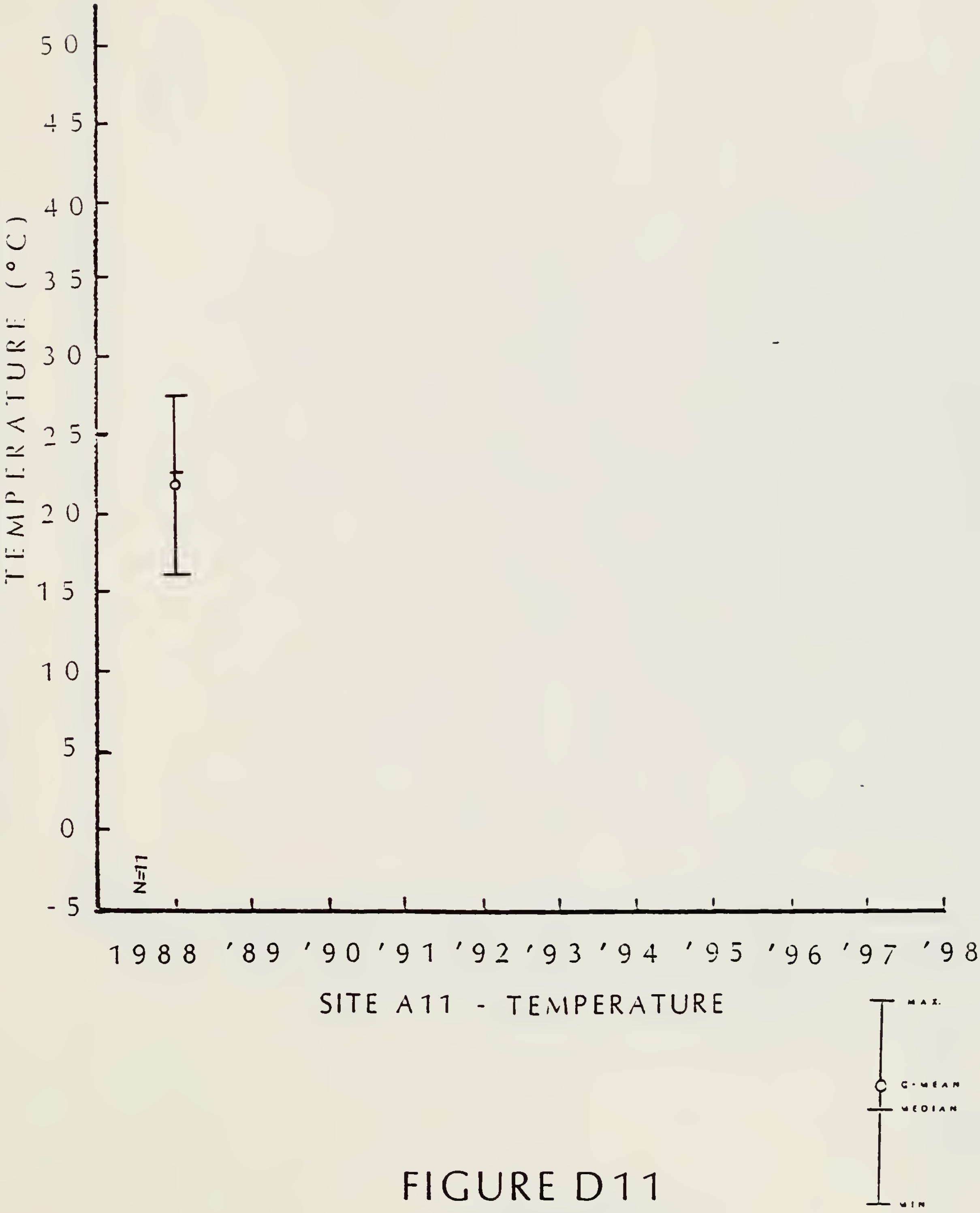
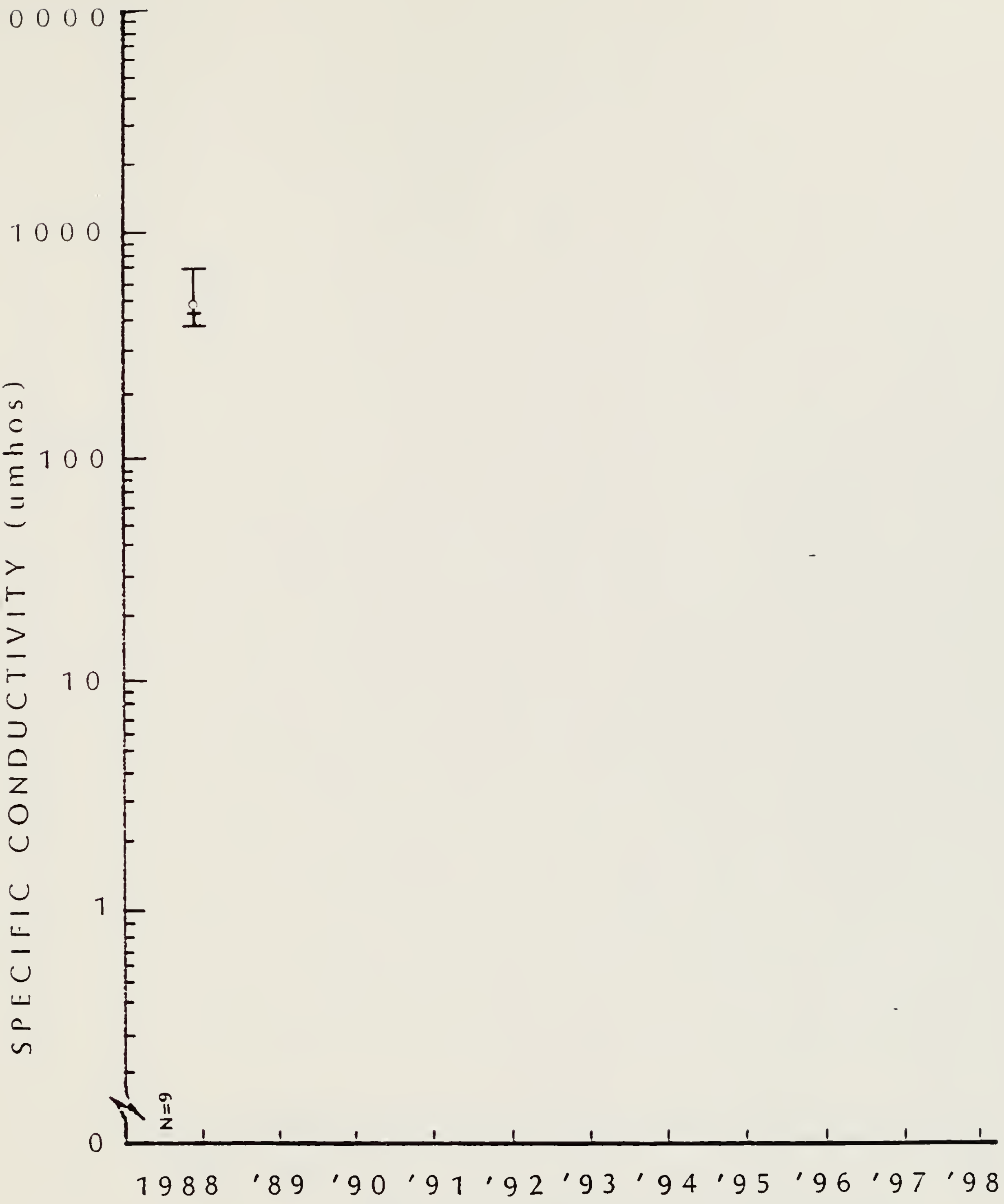

TEMPERATURE (°C)
50
45
40
35
30
25
20
15
10
5
0
-5
N=11
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A11 - TEMPERATURE
MAX.
G-MEAN
MEDIAN
MIN

FIGURE D11



SITE A1 -SPECIFIC CONDUCTIVITY

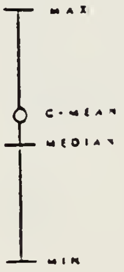
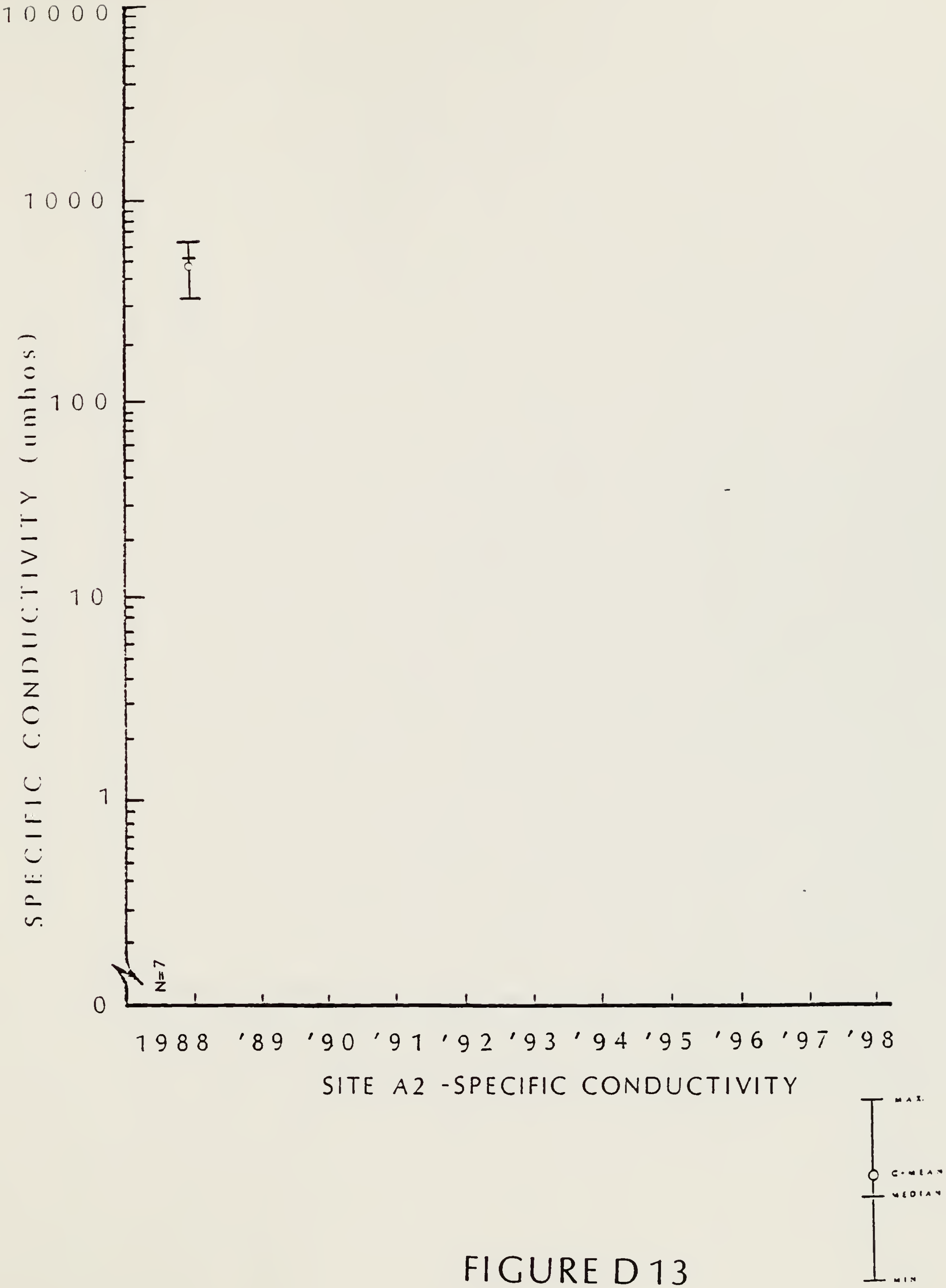
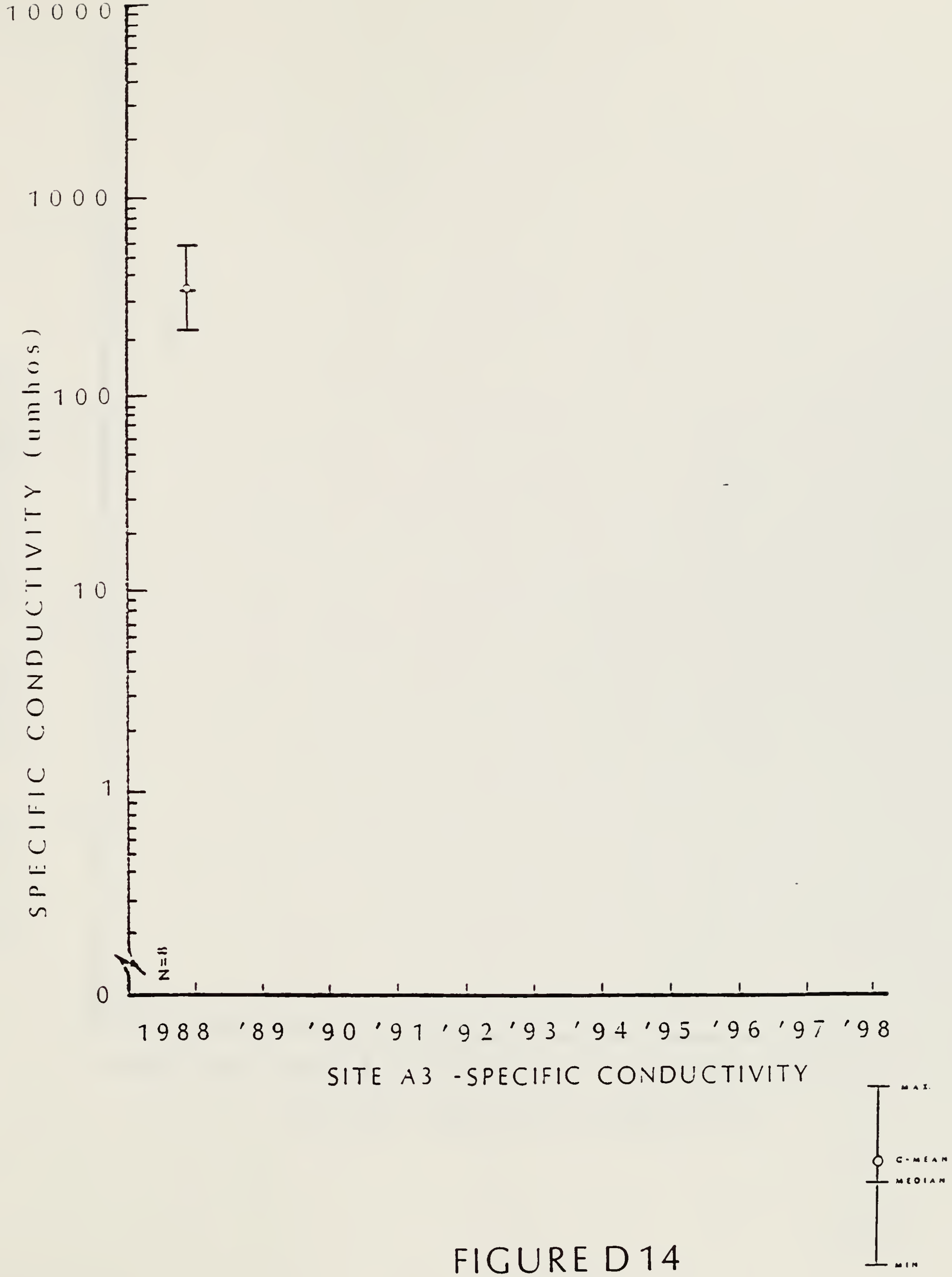


FIGURE D12



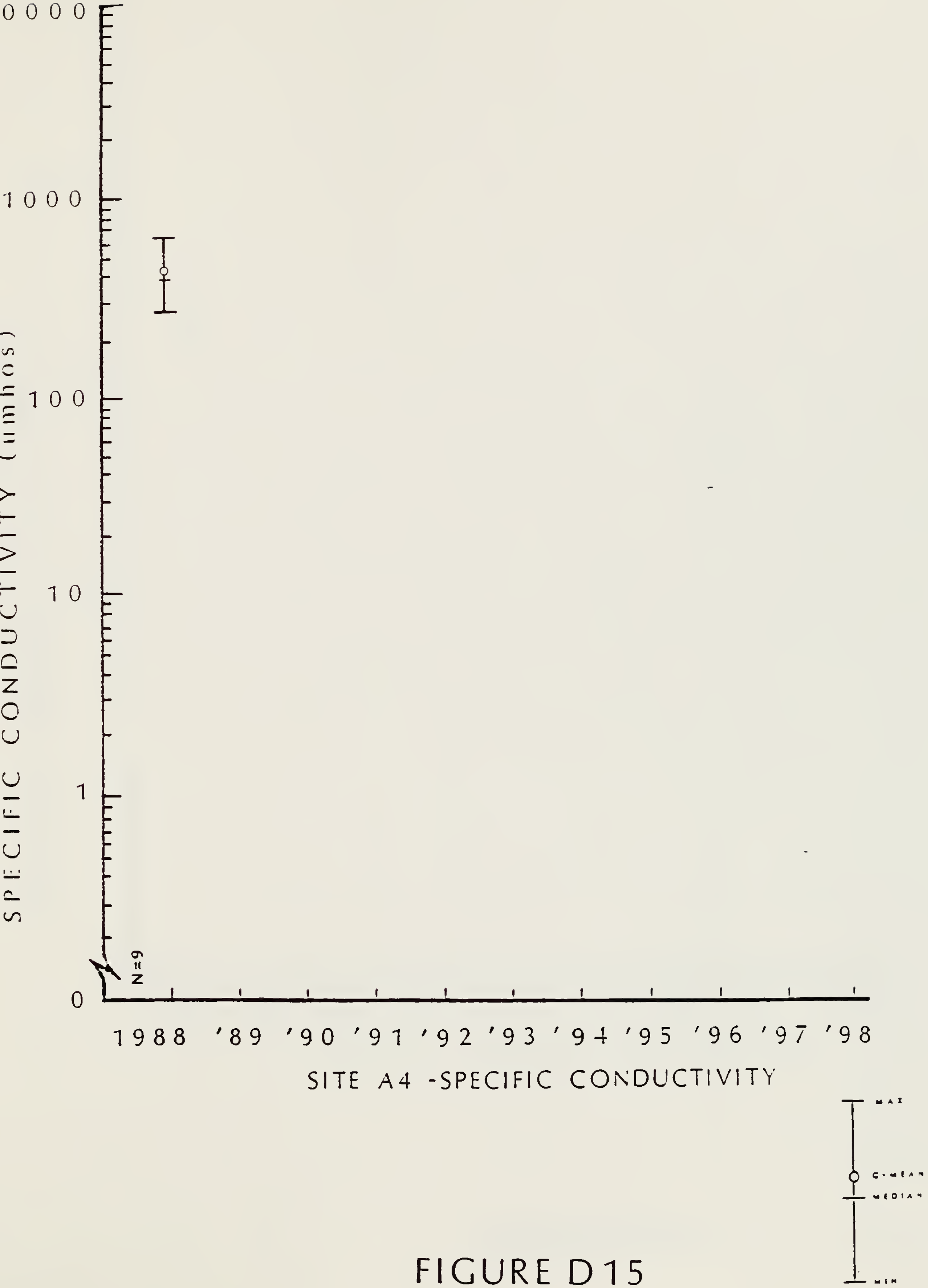
SITE A2 -SPECIFIC CONDUCTIVITY

FIGURE D13



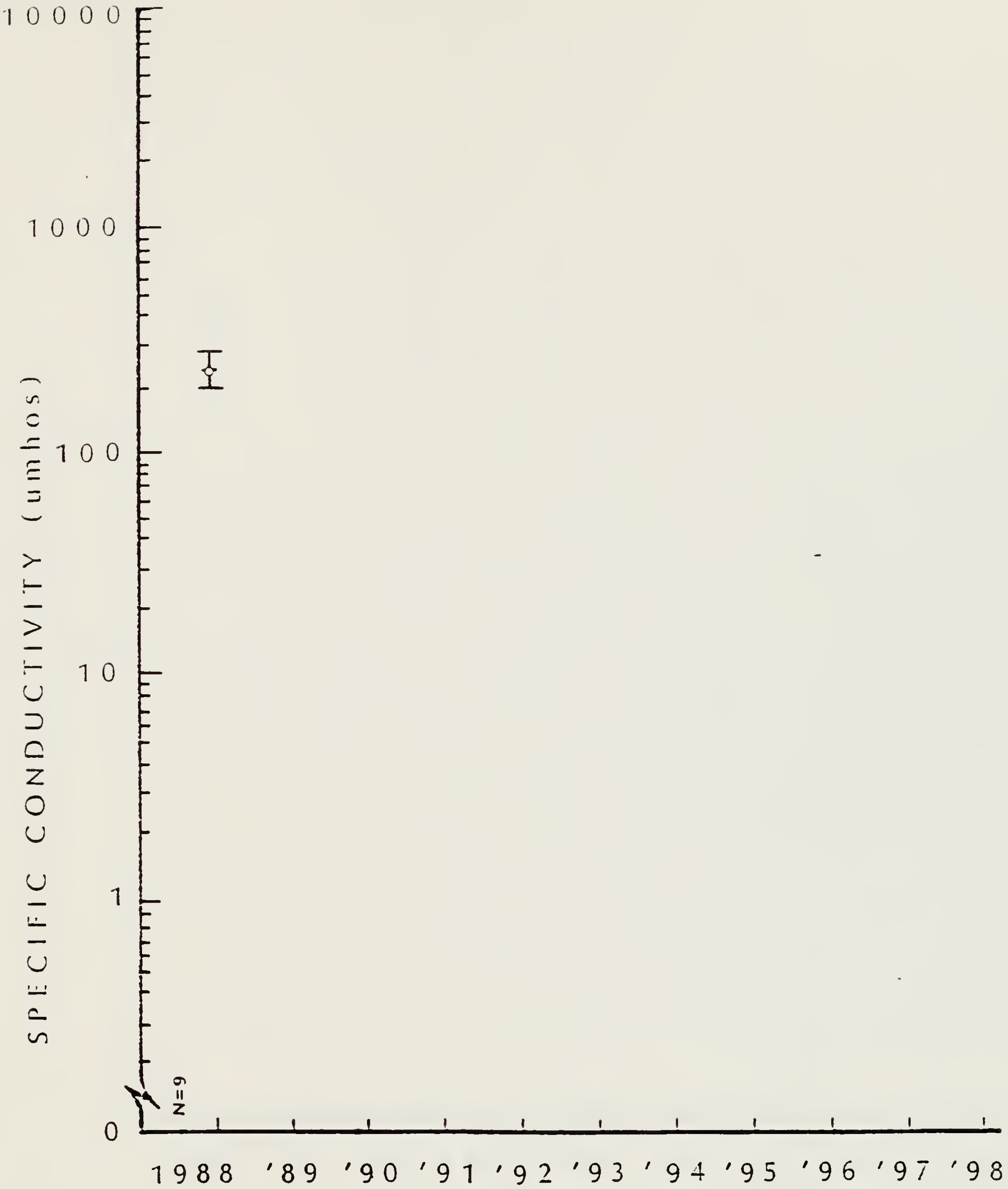
SITE A3 -SPECIFIC CONDUCTIVITY

FIGURE D14



SITE A4 -SPECIFIC CONDUCTIVITY

FIGURE D15



SITE A5 -SPECIFIC CONDUCTIVITY

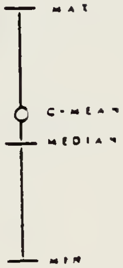
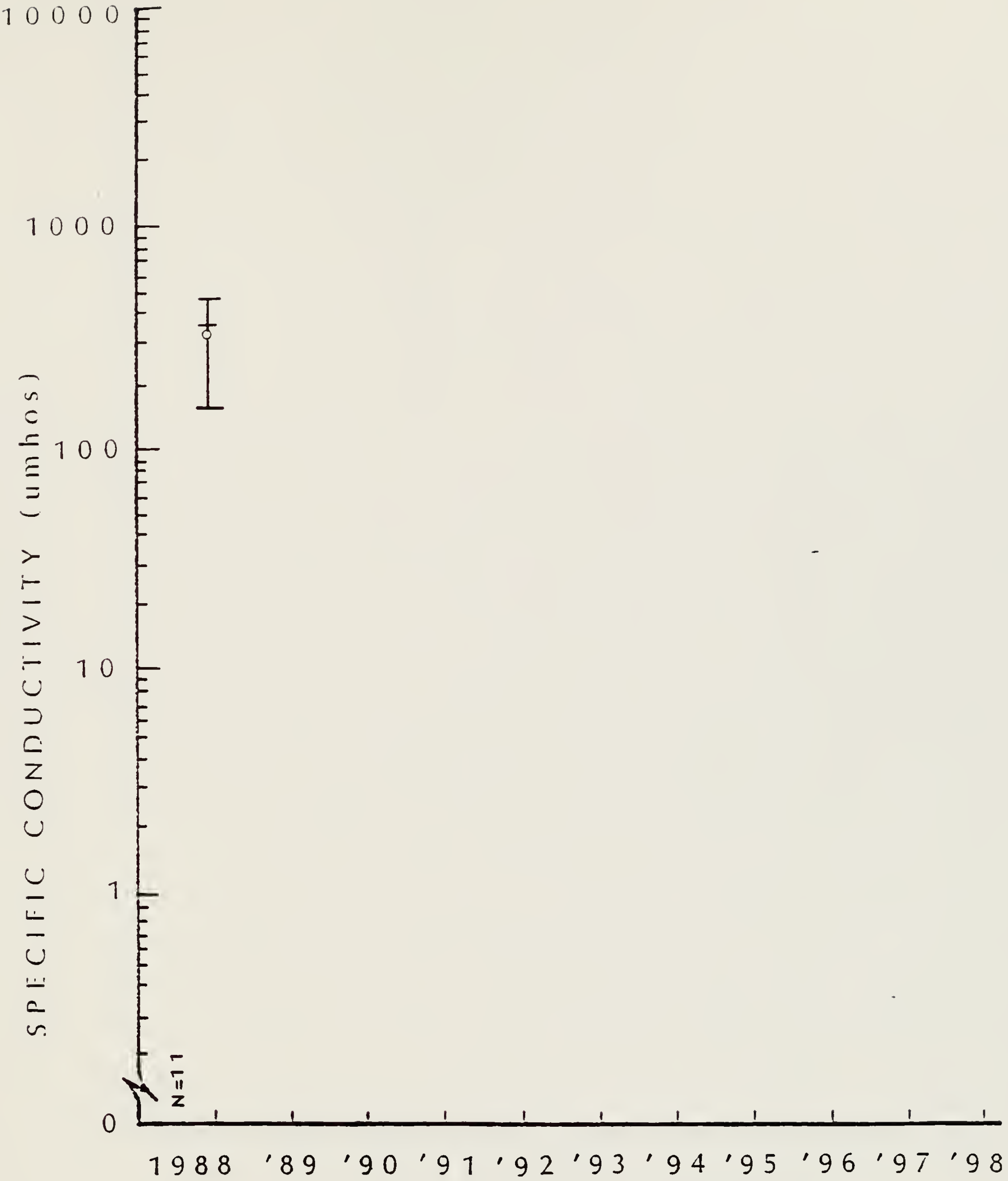


FIGURE D16



SITE A6 -SPECIFIC CONDUCTIVITY

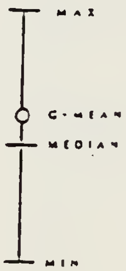


FIGURE D17

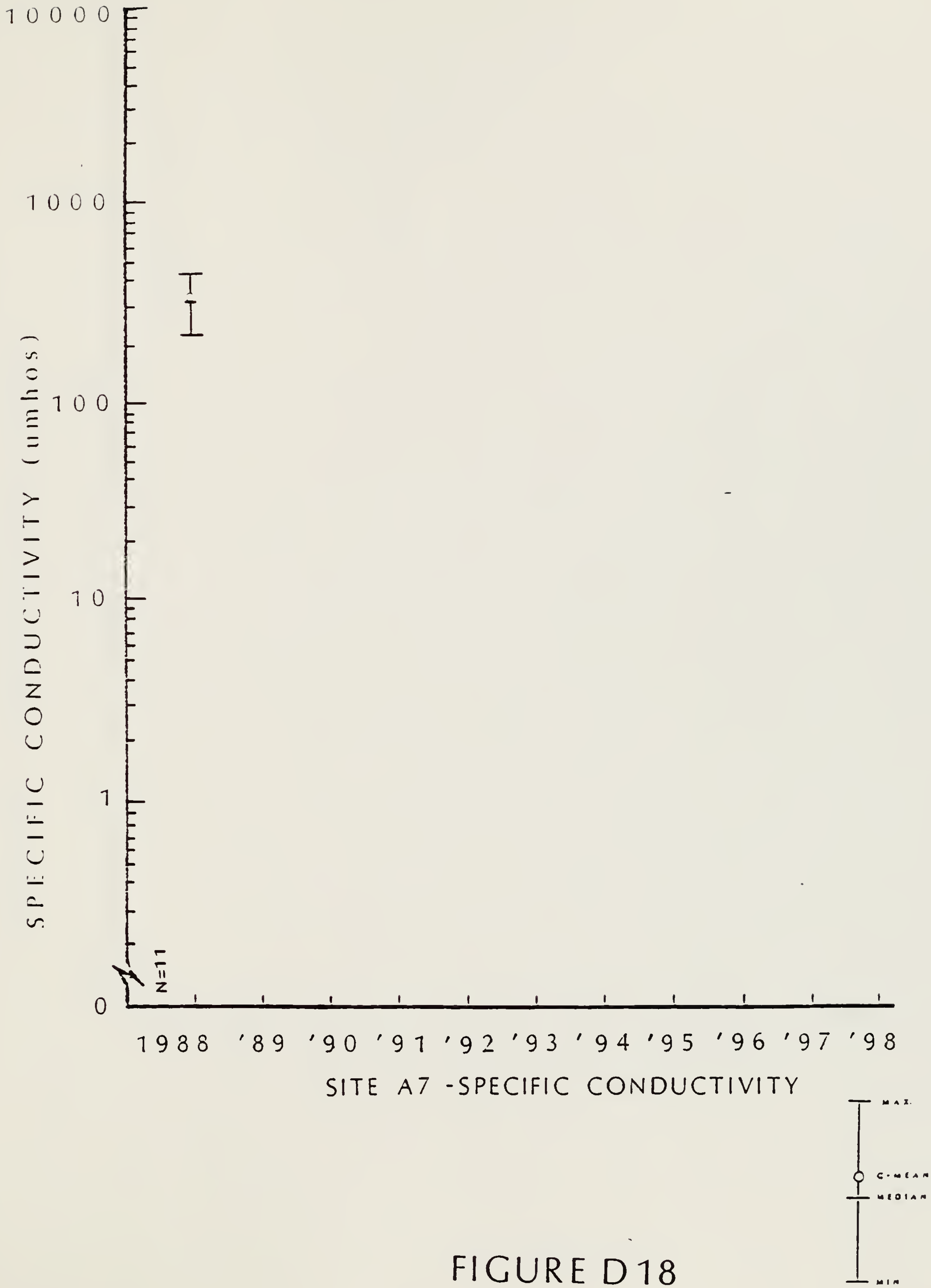
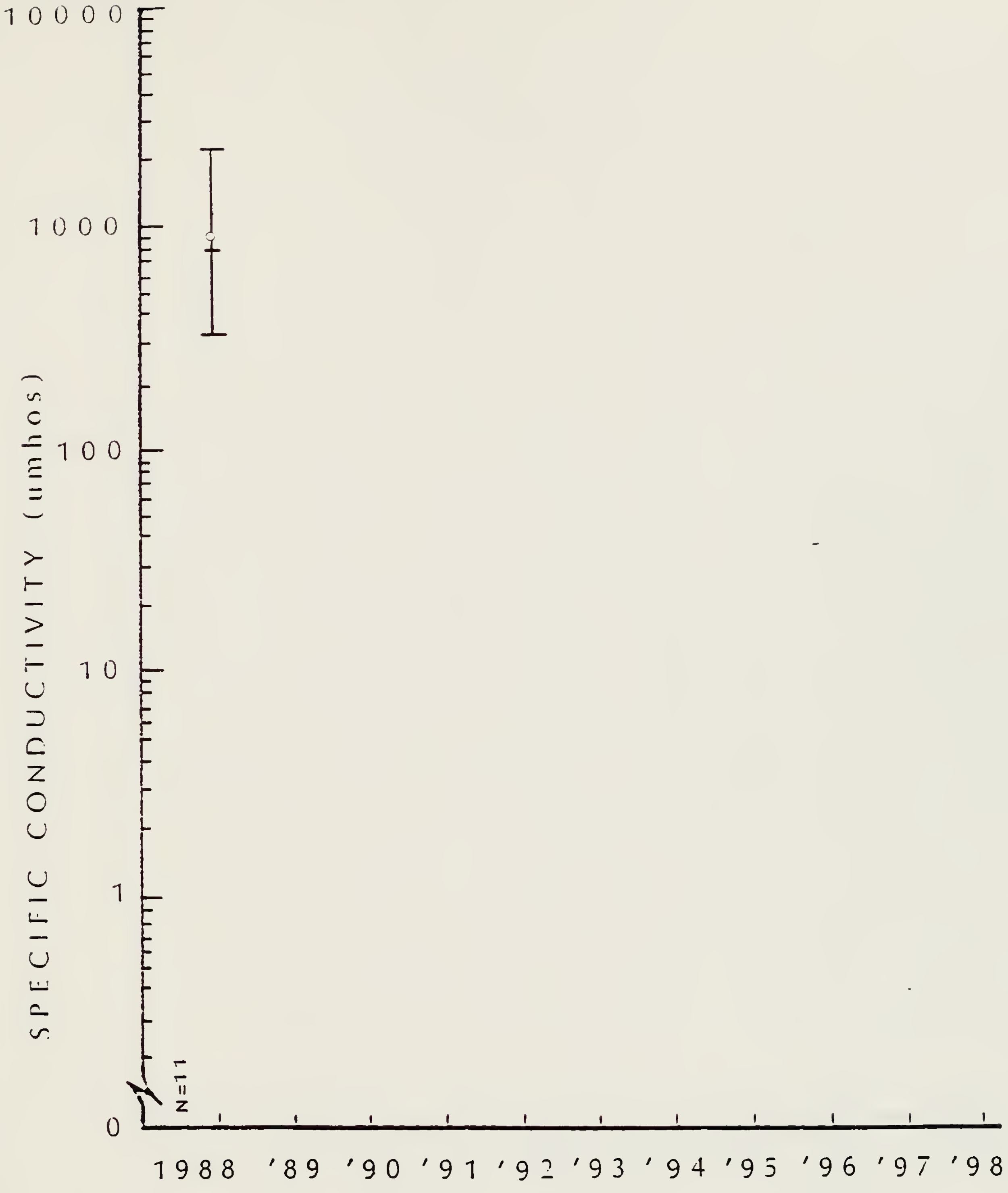

10000
1000
100
10
1
0
SPECIFIC CONDUCTIVITY (umhos)
N=11
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A7 -SPECIFIC CONDUCTIVITY
MAX.
C-MEAN
MEDIAN
MIN

FIGURE D18



SITE A8 -SPECIFIC CONDUCTIVITY

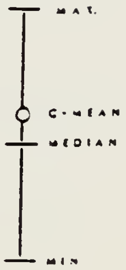
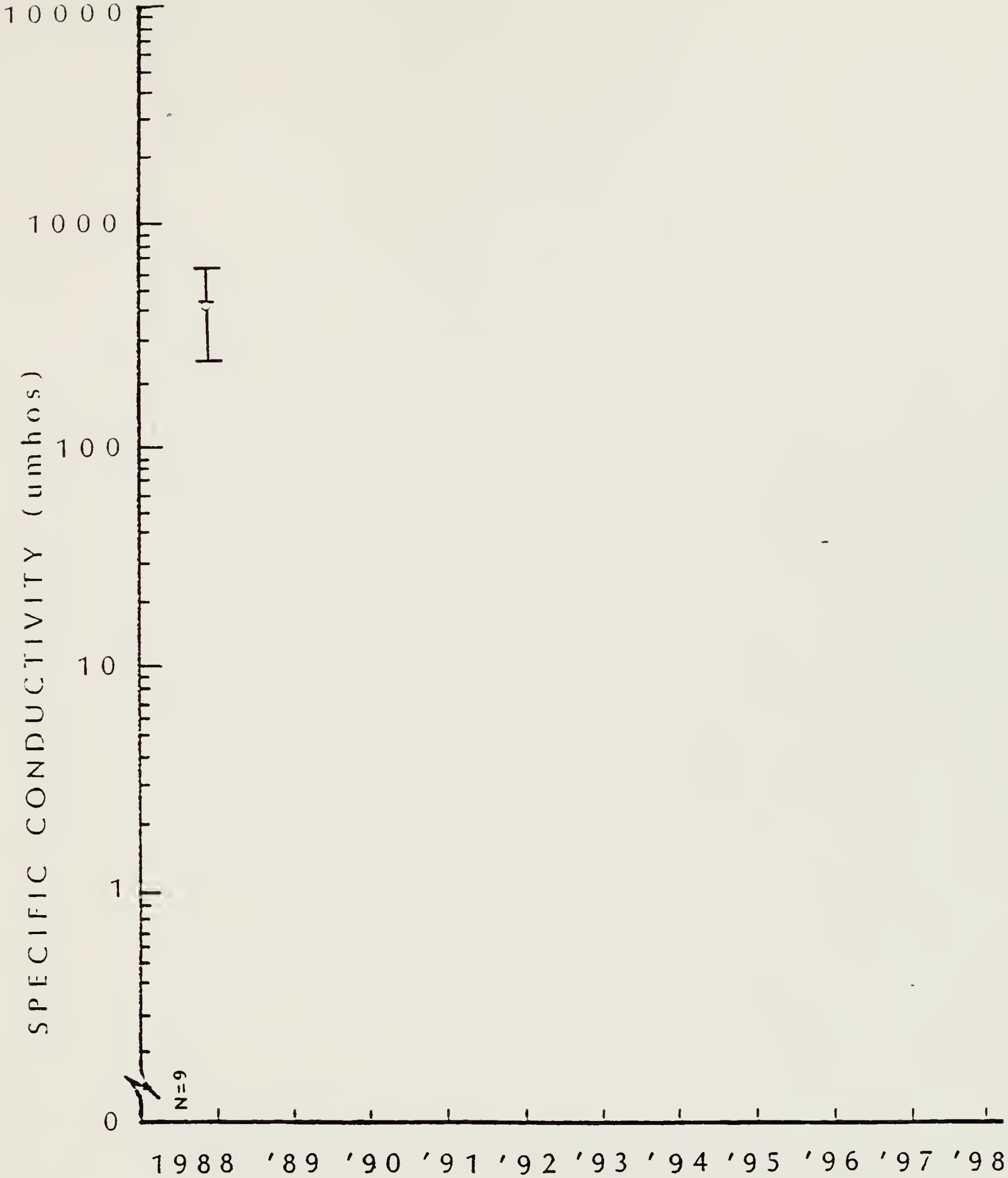


FIGURE D19



SITE A9 -SPECIFIC CONDUCTIVITY

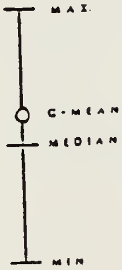
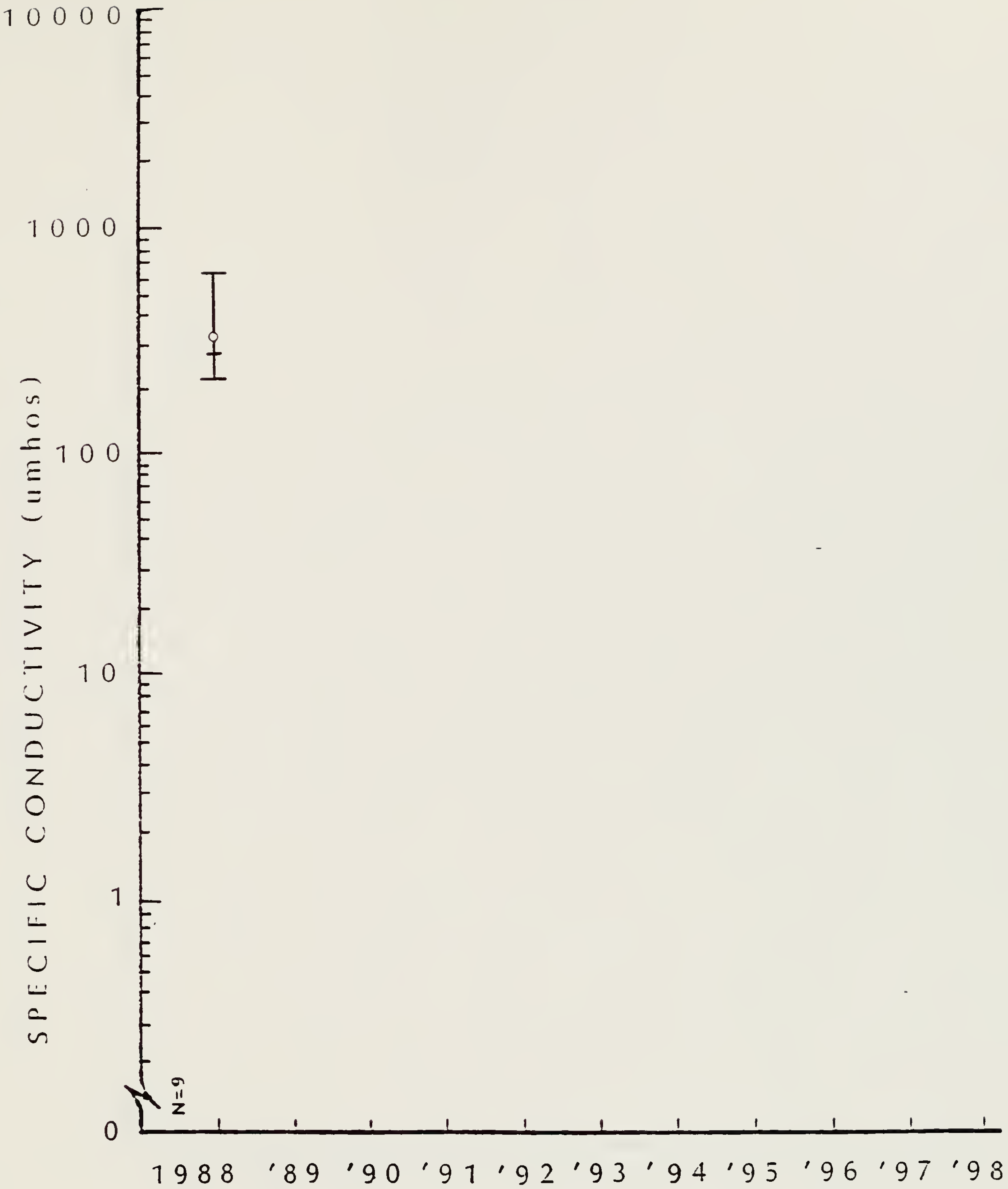


FIGURE D20



SITE A10 -SPECIFIC CONDUCTIVITY

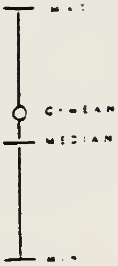
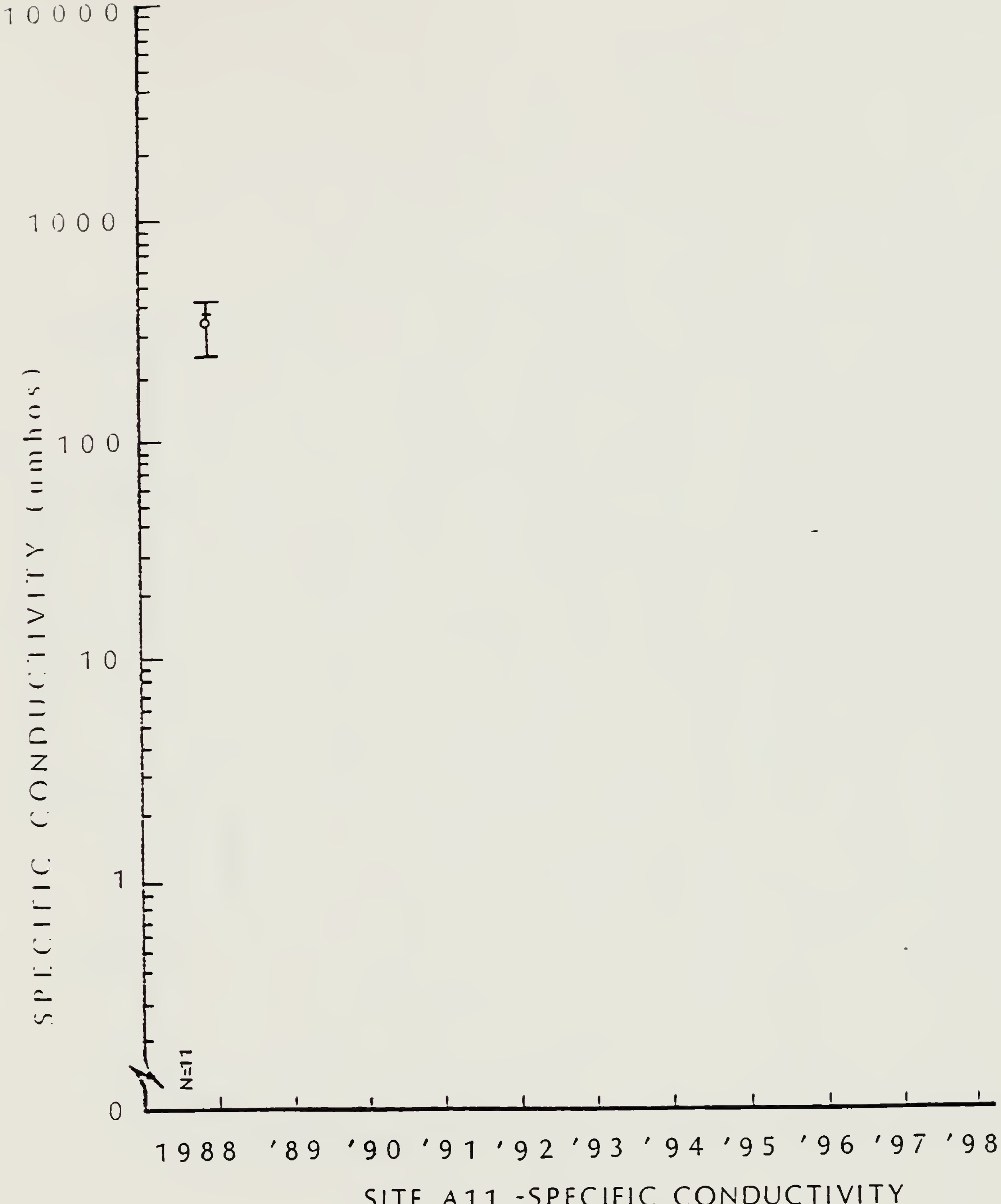


FIGURE D21



SITE A11 -SPECIFIC CONDUCTIVITY

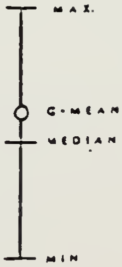


FIGURE D22

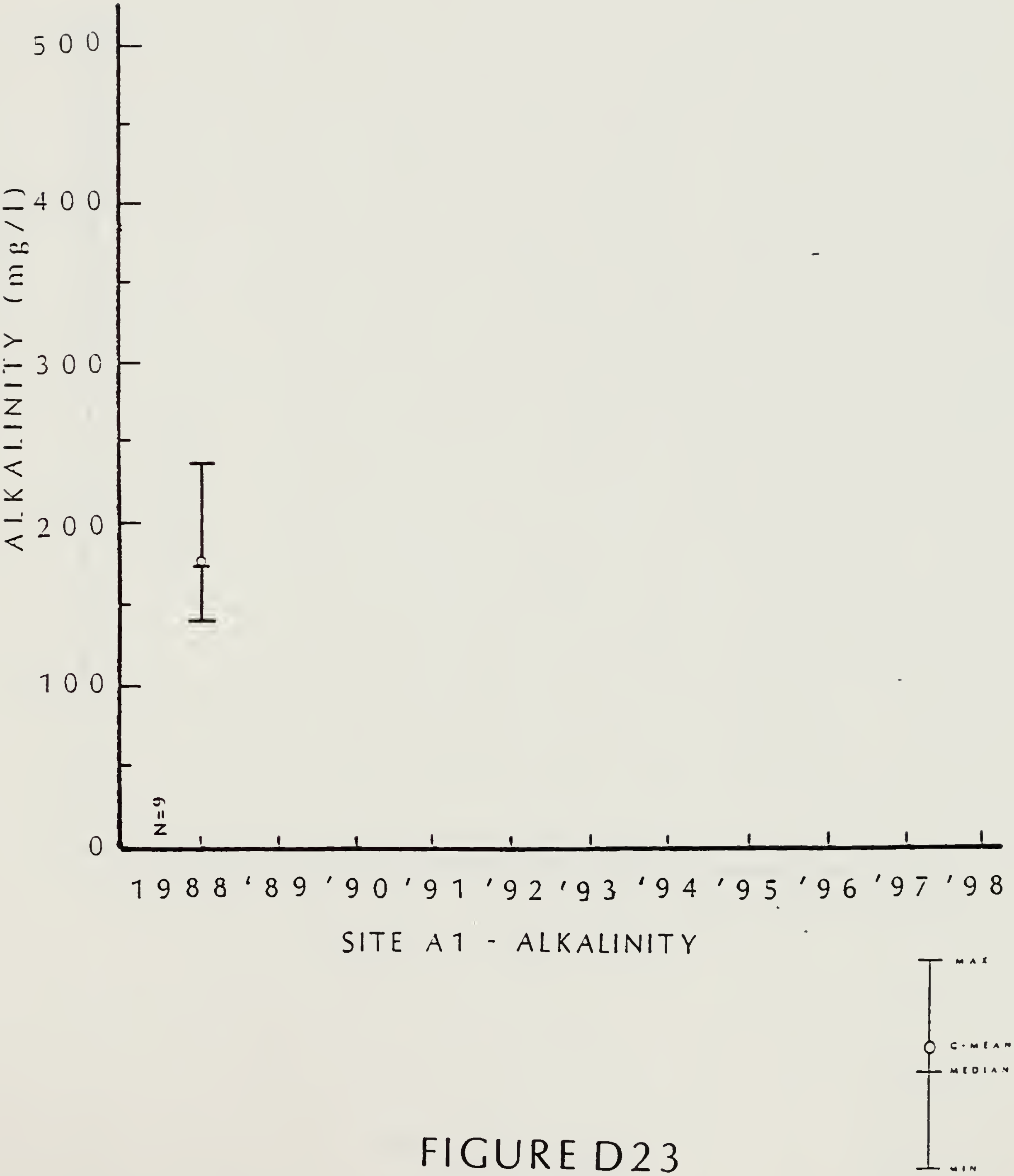
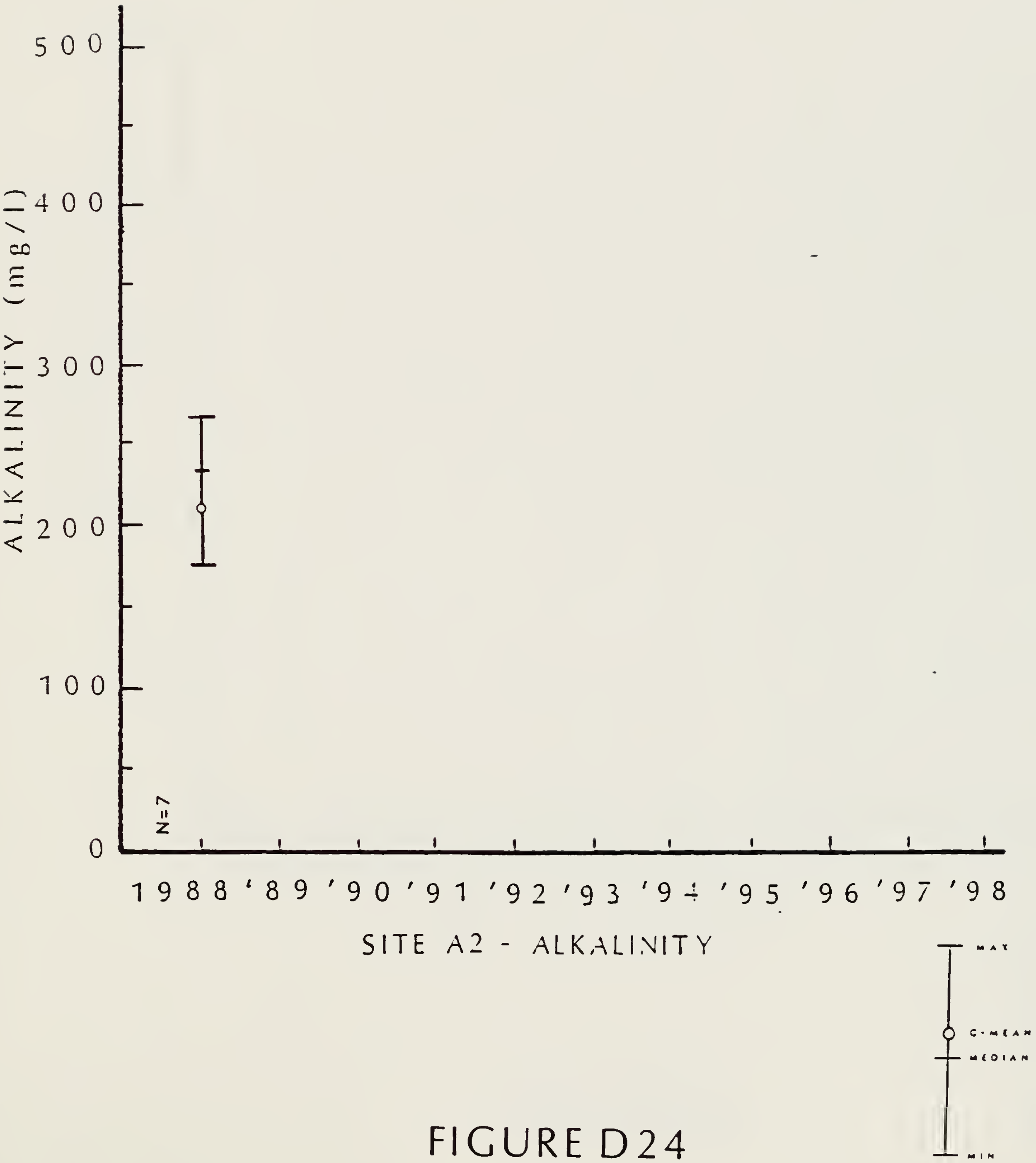
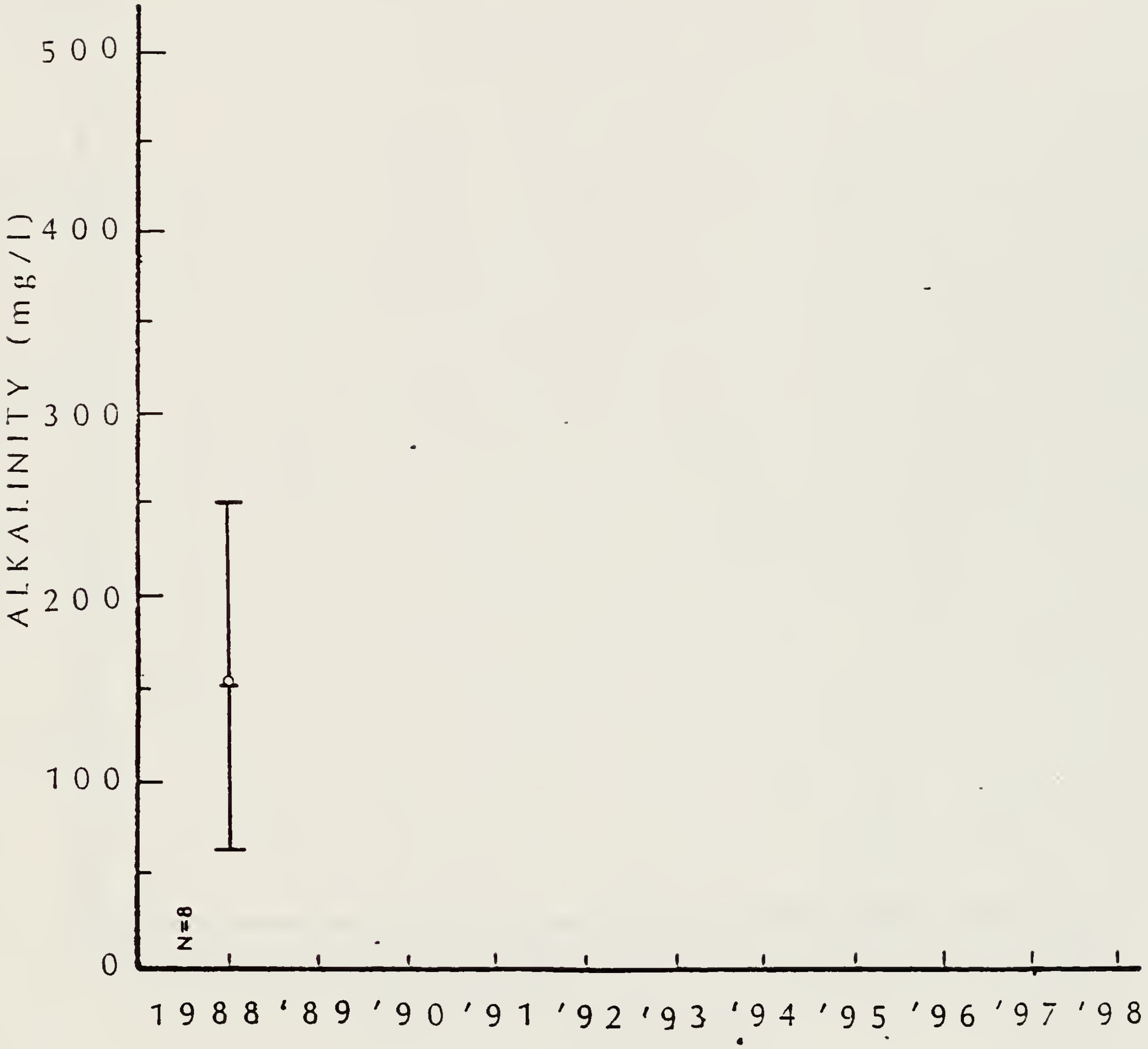

500
400
300
200
100
0
ALKALINITY (mg/l)
N=9
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A1 - ALKALINITY
MAX
G-MEAN
MEDIAN
MIN

FIGURE D23



SITE A2 - ALKALINITY

FIGURE D24



SITE A3 - ALKALINITY

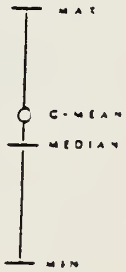


FIGURE D25

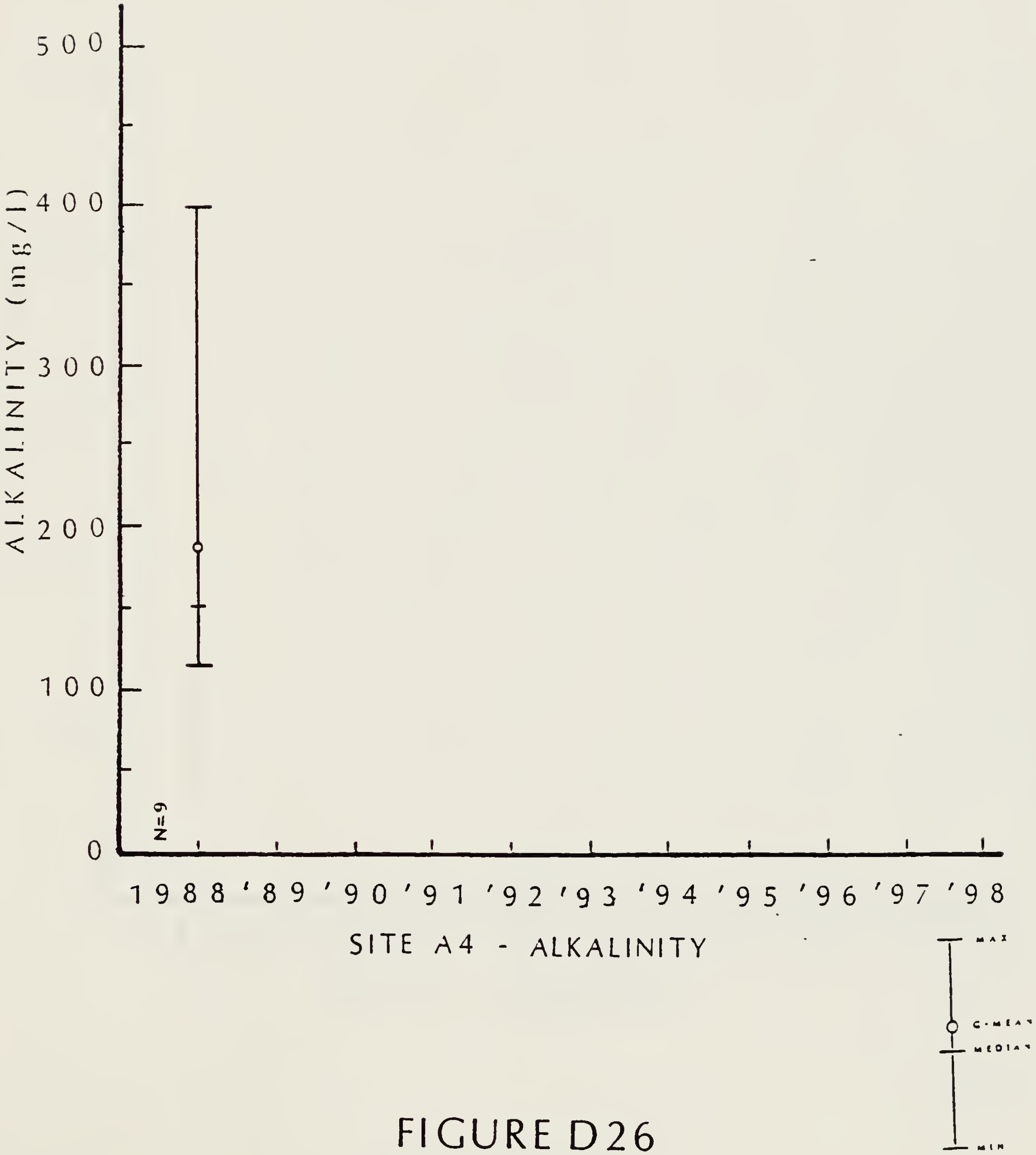

ALKALINITY (mg/l)
500
400
300
200
100
0
N=9
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A4 - ALKALINITY
MAX
G-MEAN
MEDIAN
MIN

FIGURE D26

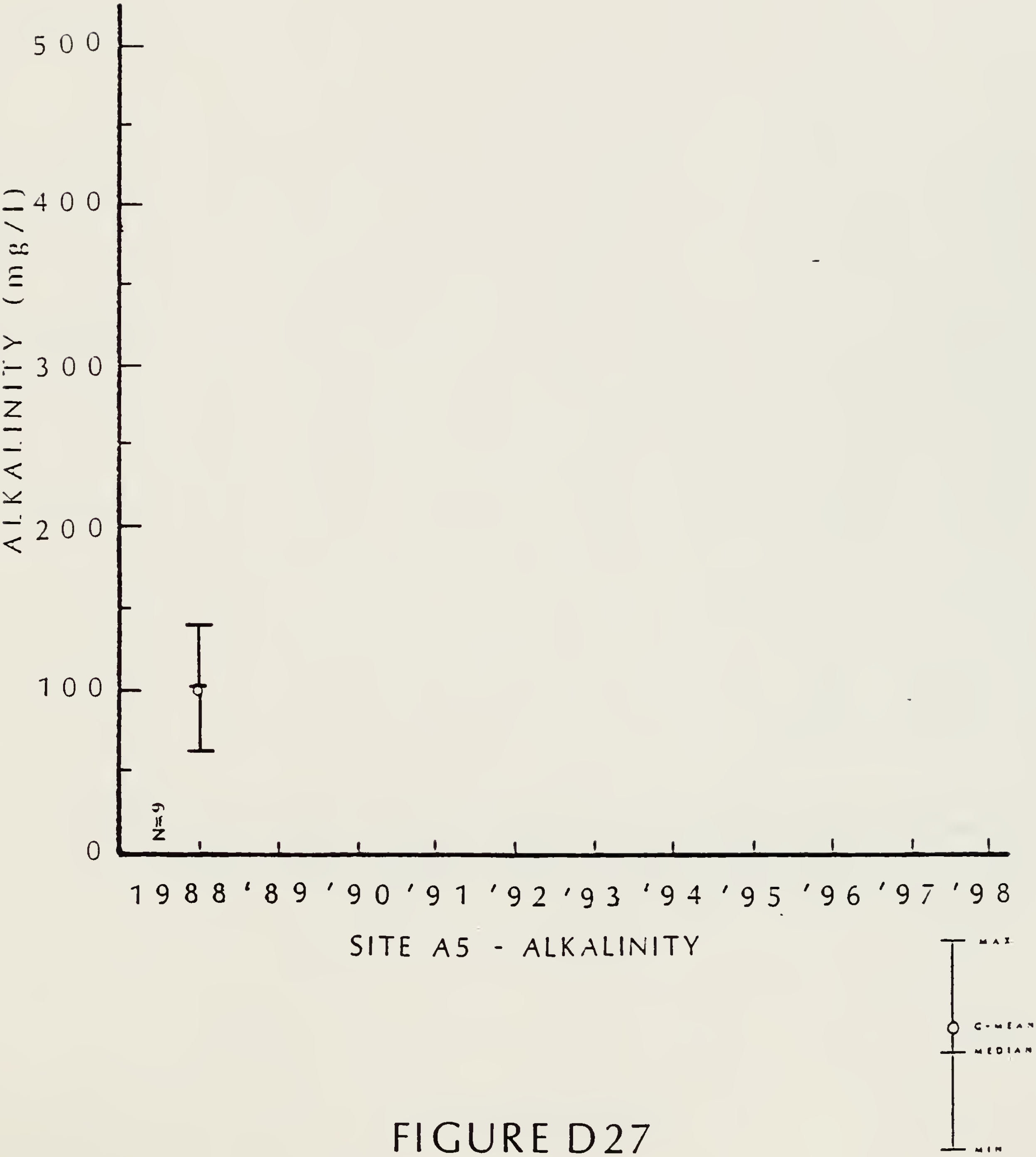
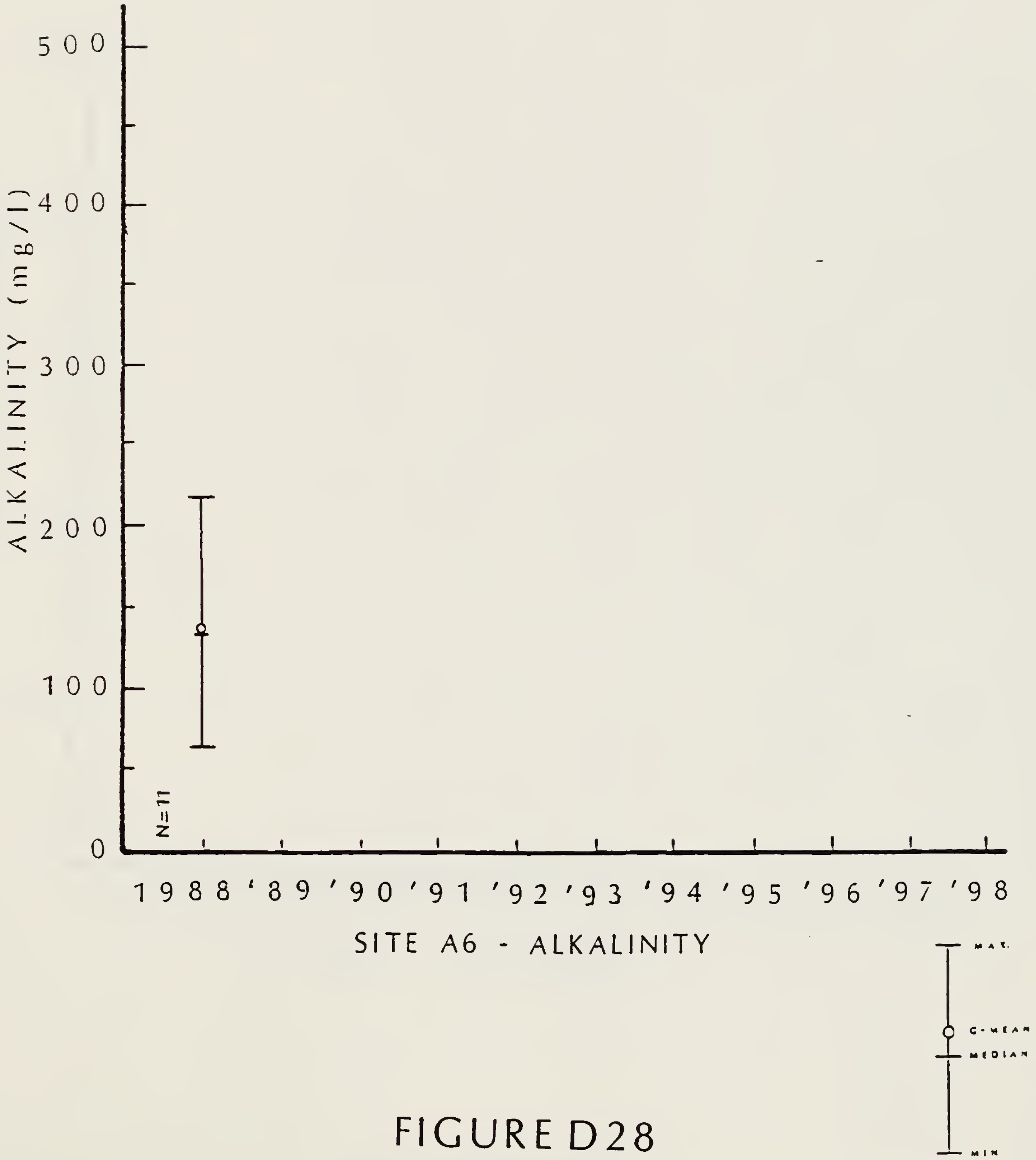
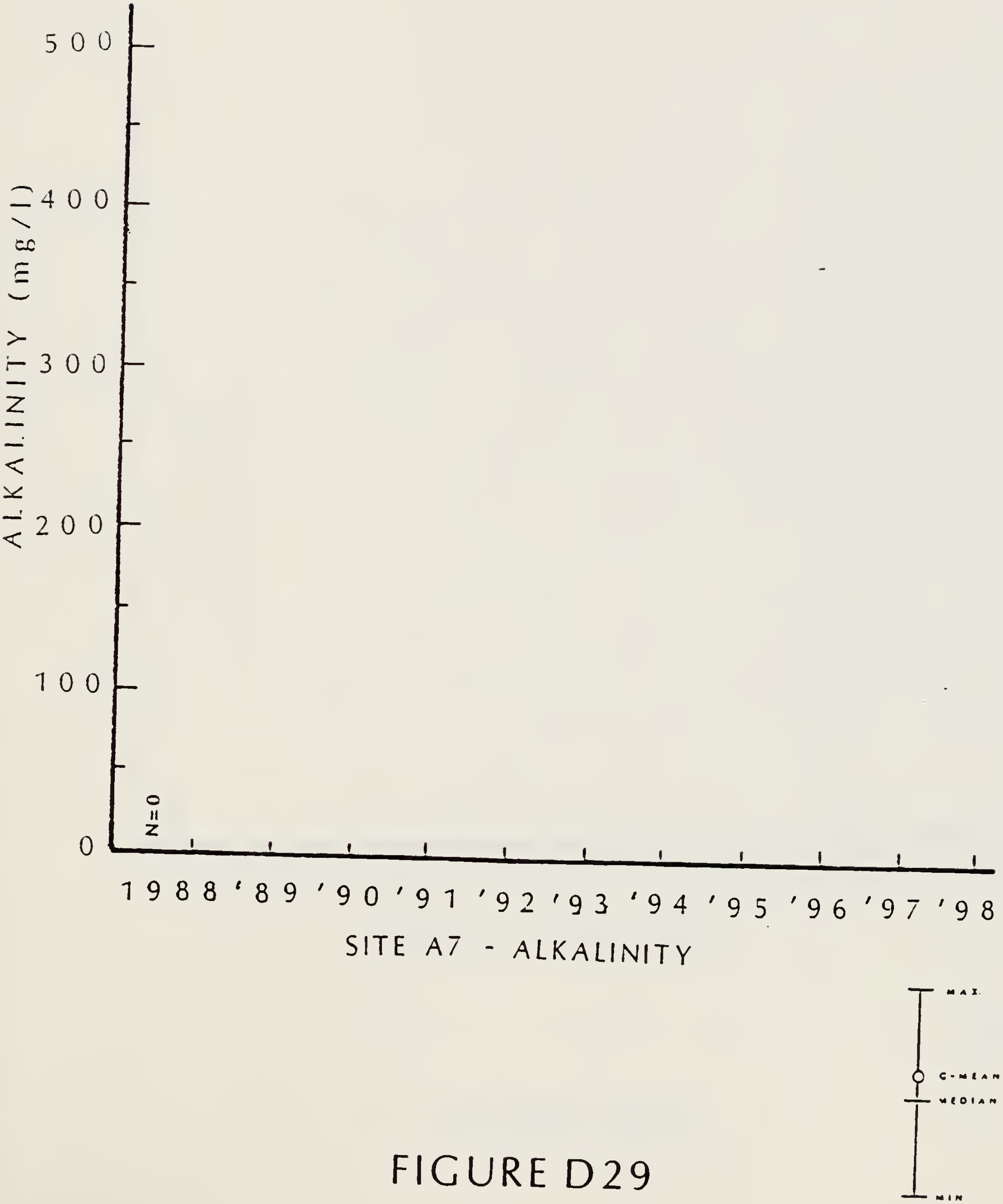

ALKALINITY (mg/l)
500
400
300
200
100
0
N=9
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A5 - ALKALINITY
MAX
G-MEAN
MEDIAN
MIN

FIGURE D27



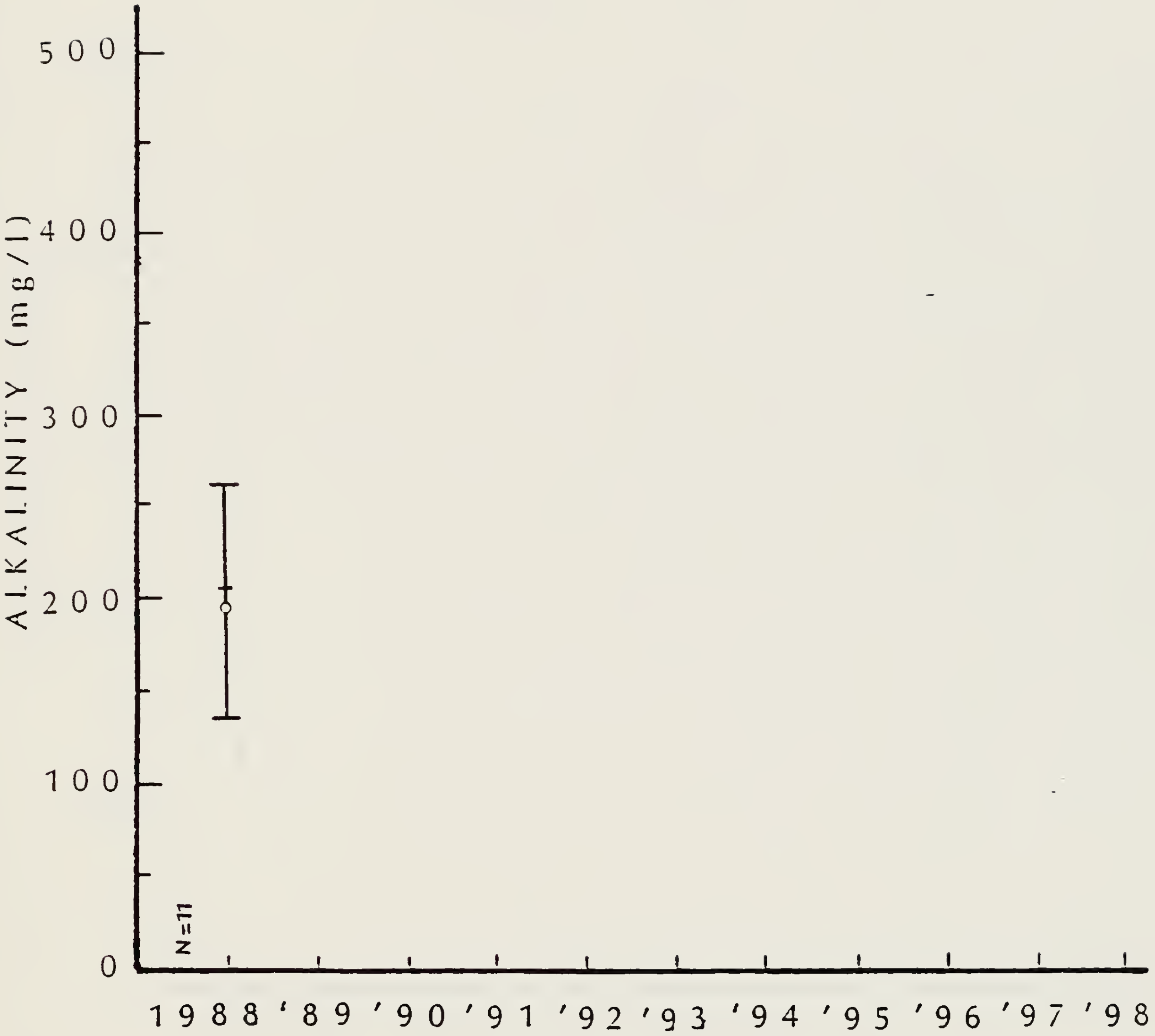
SITE A6 - ALKALINITY

FIGURE D28



SITE A7 - ALKALINITY

FIGURE D29



SITE A8 - ALKALINITY

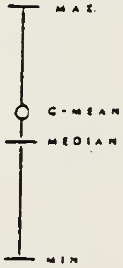


FIGURE D30

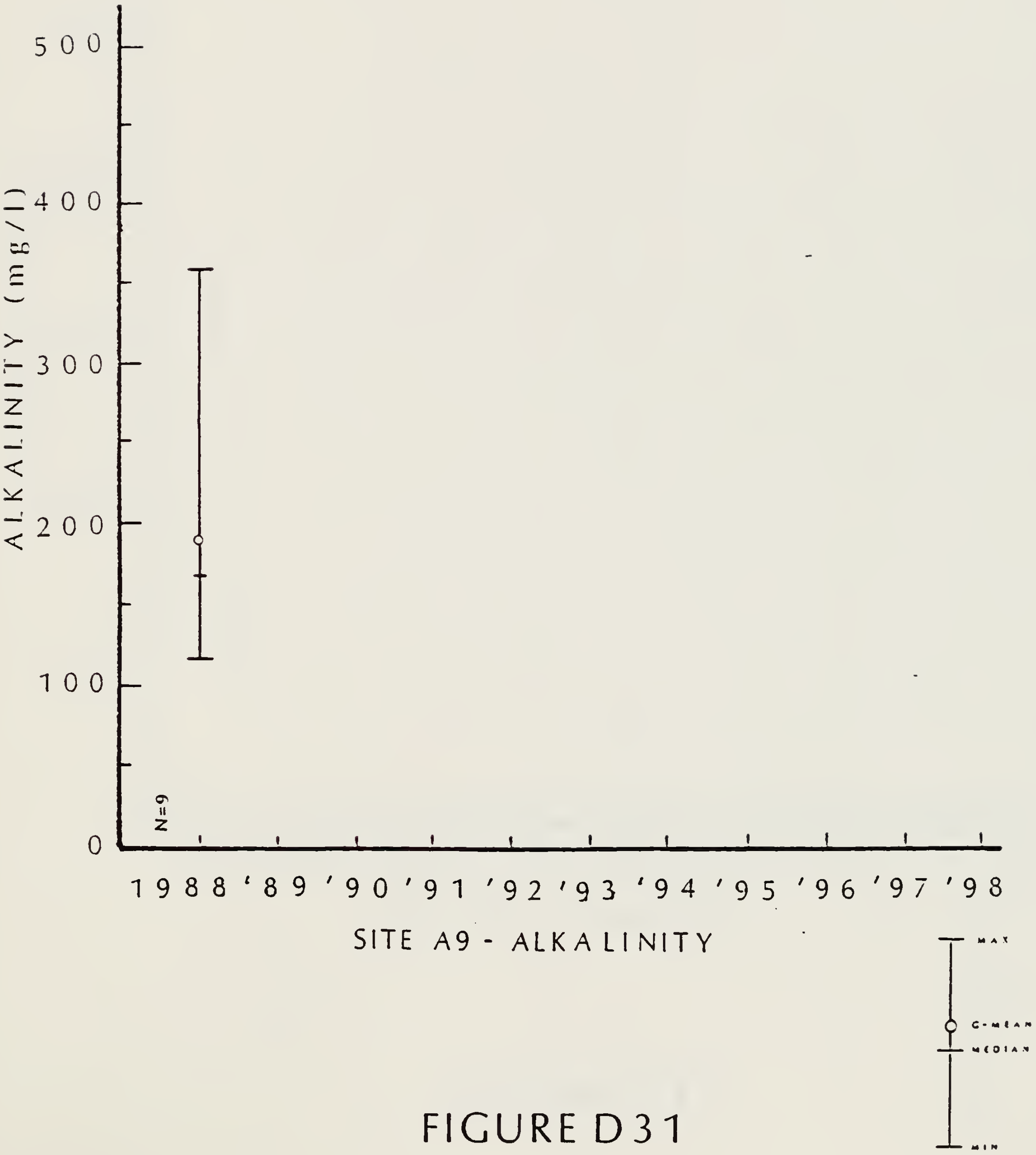
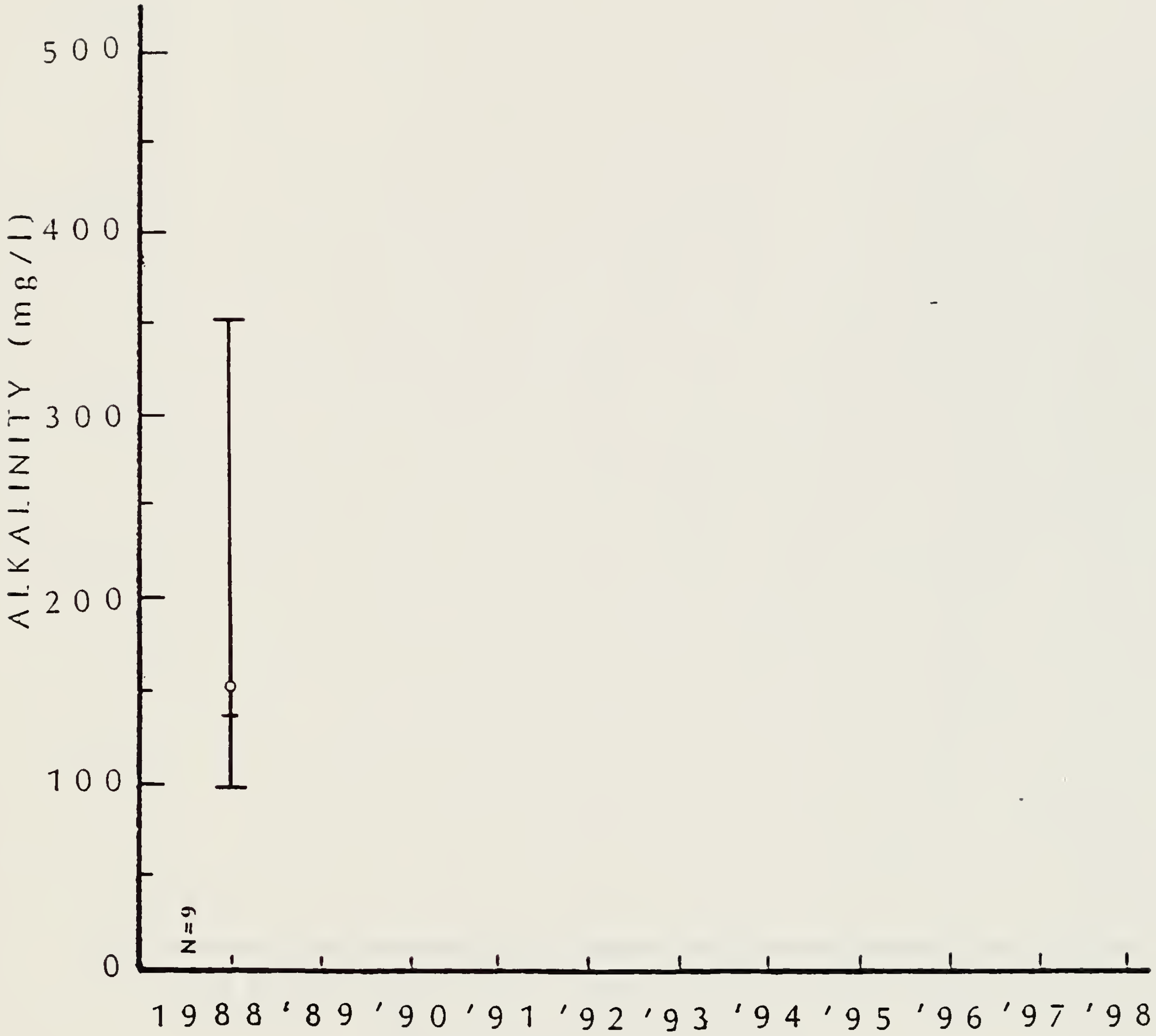

ALKALINITY (mg/l)
500
400
300
200
100
0
N=9
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A9 - ALKALINITY
MAX
G-MEAN
MEDIAN
MIN

FIGURE D31



SITE A10 - ALKALINITY

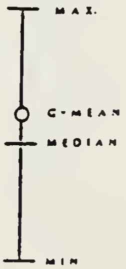


FIGURE D32

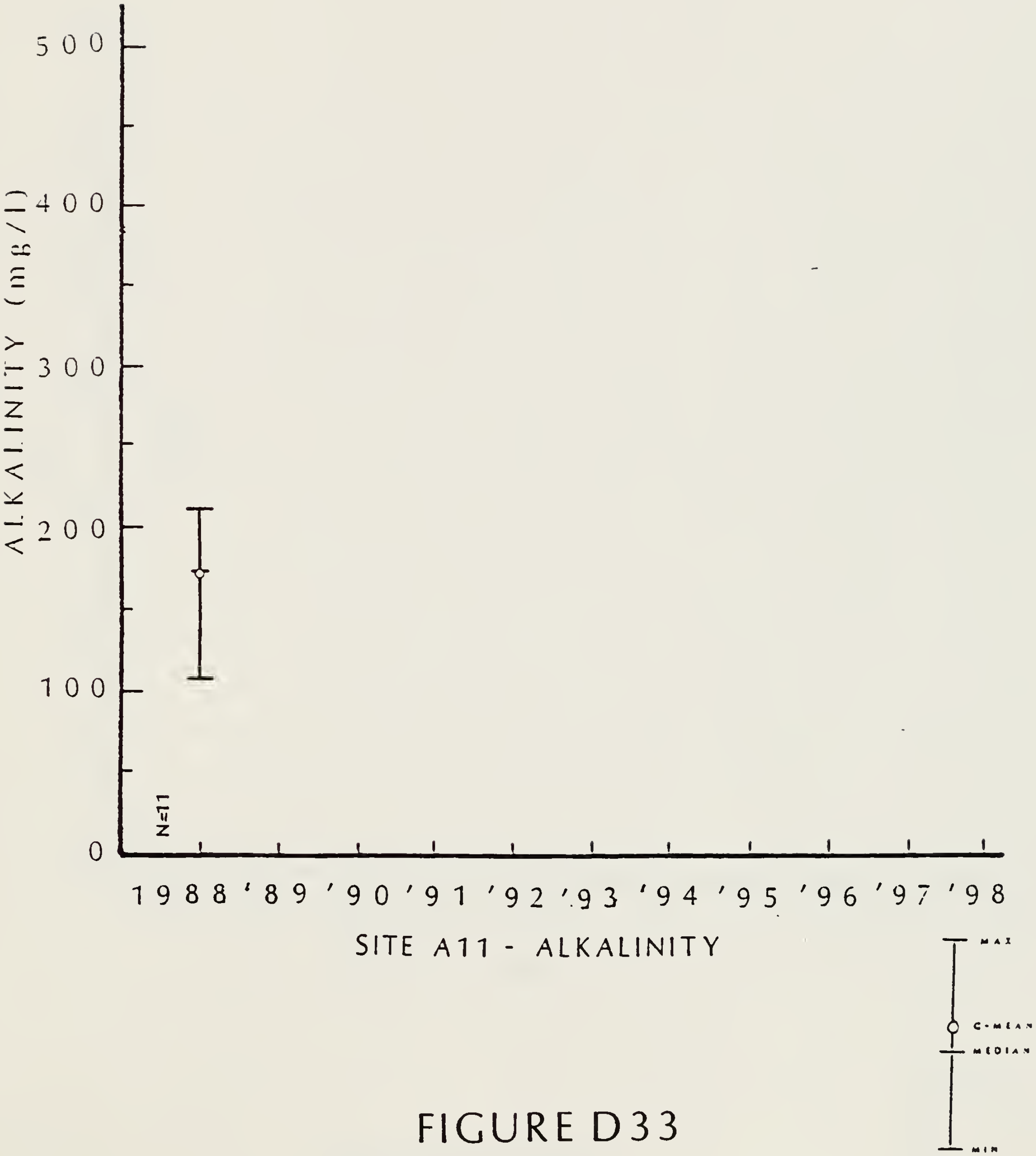
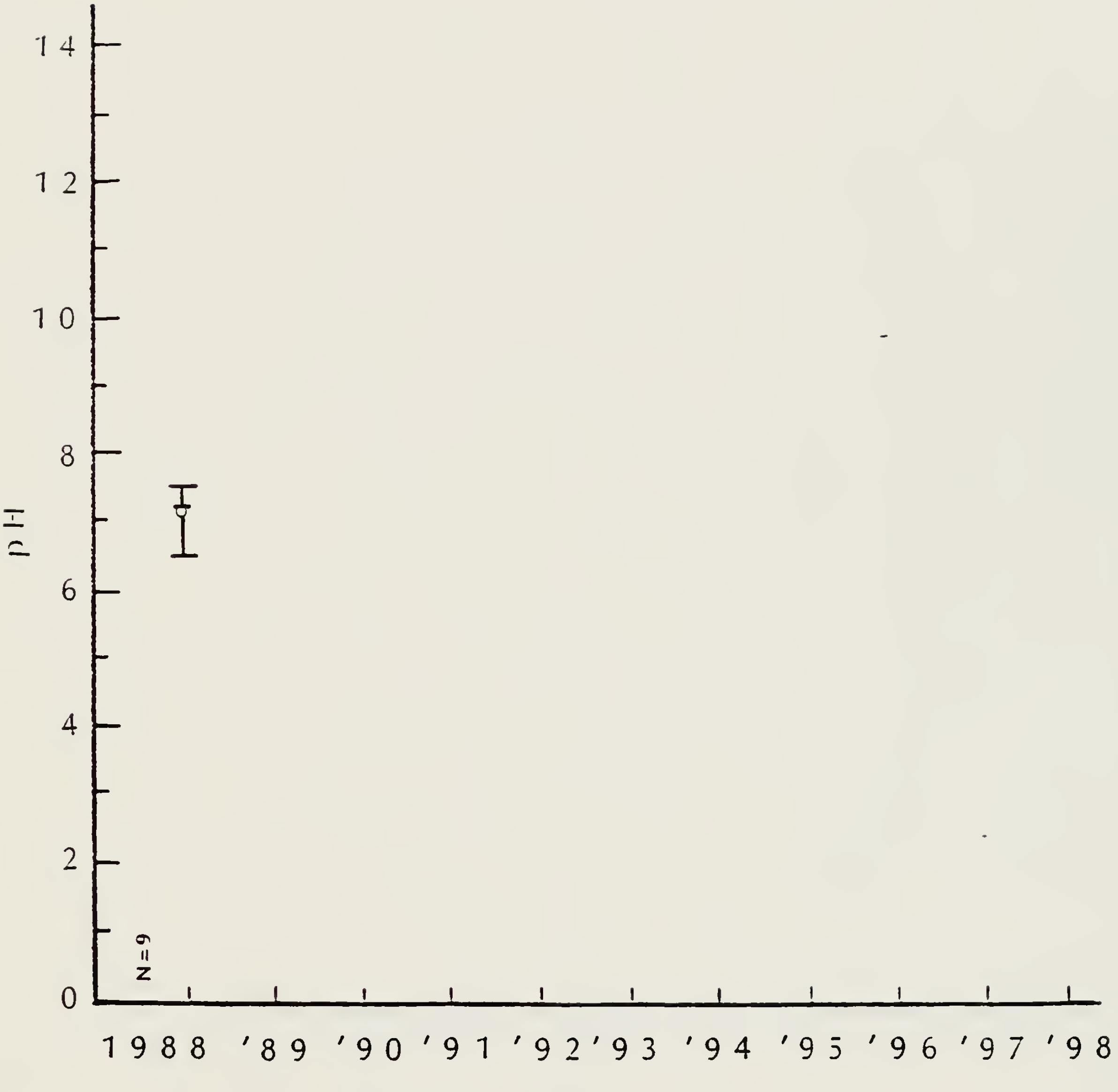
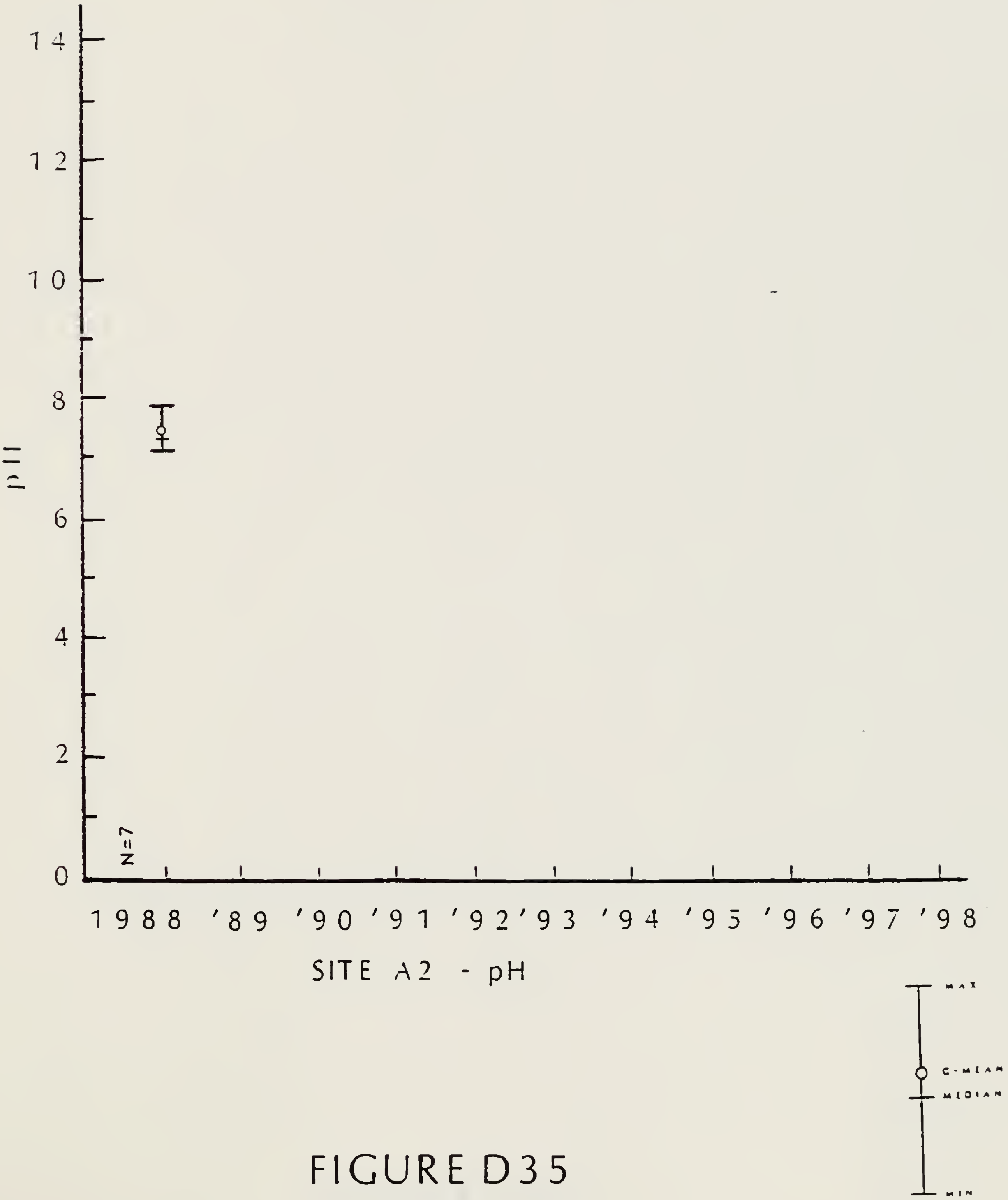

ALKALINITY (mg/l)
500
400
300
200
100
0
N=11
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A11 - ALKALINITY
MAX
G-MEAN
MEDIAN
MIN

FIGURE D33


14
12
10
8
6
4
2
0
pH
N=9
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A1 - pH

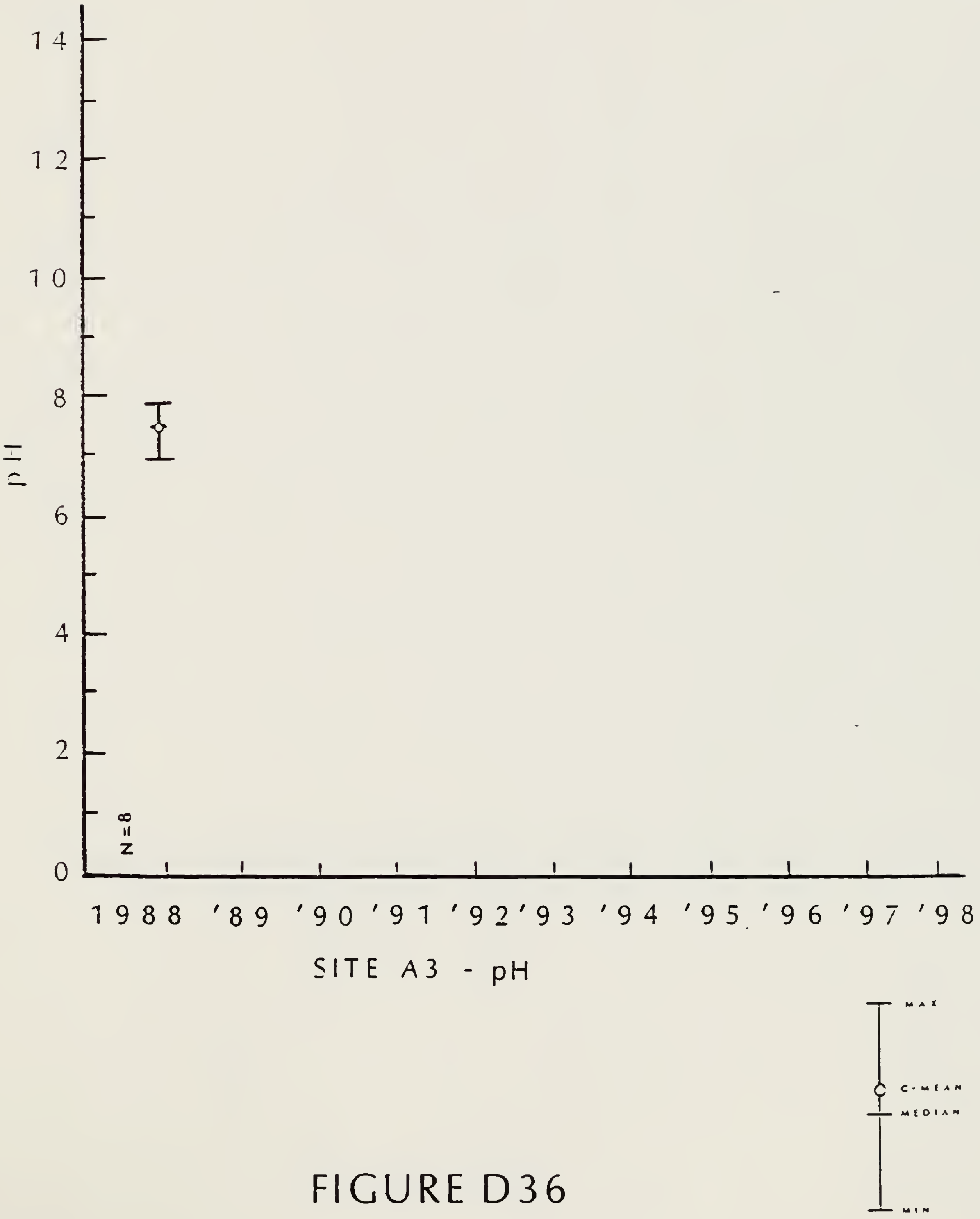
MAX
G-MEAN
MEDIAN
MIN

FIGURE D34



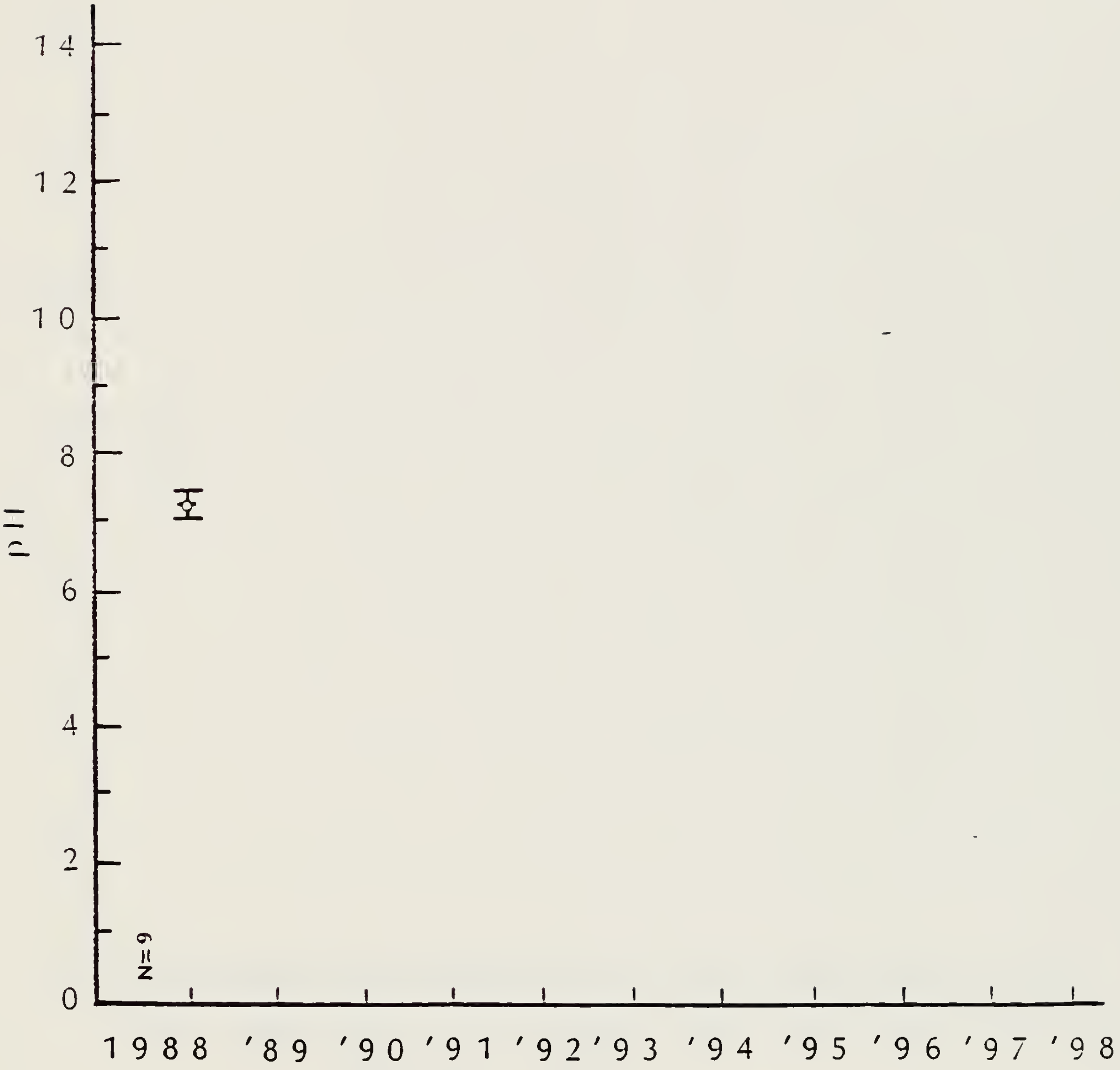
SITE A2 - pH

FIGURE D35



SITE A3 - pH

FIGURE D36



SITE A4 - pH

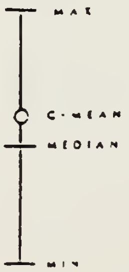
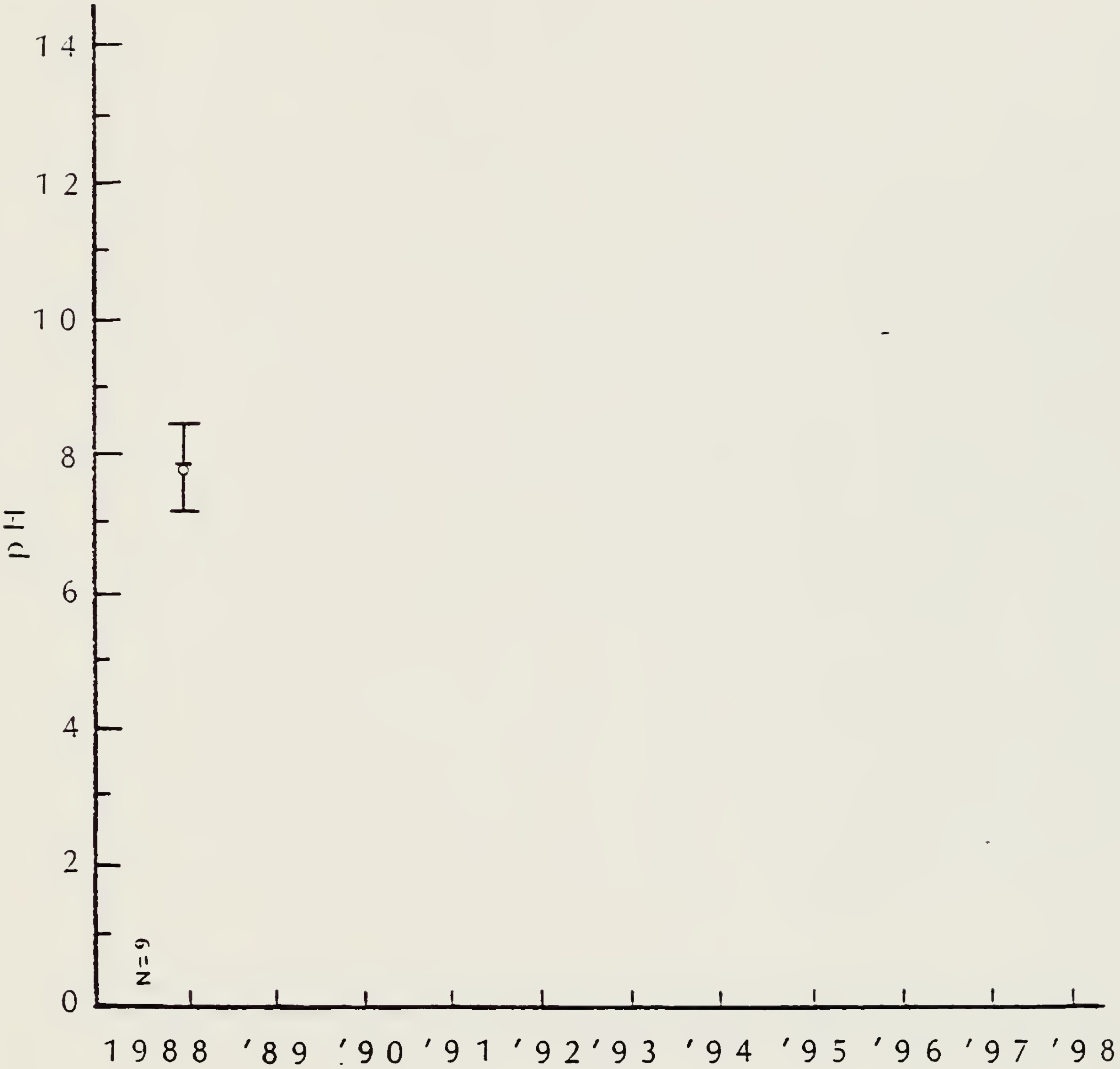


FIGURE D37



SITE A5 - pH

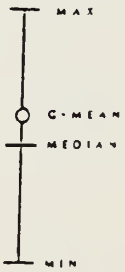


FIGURE D38

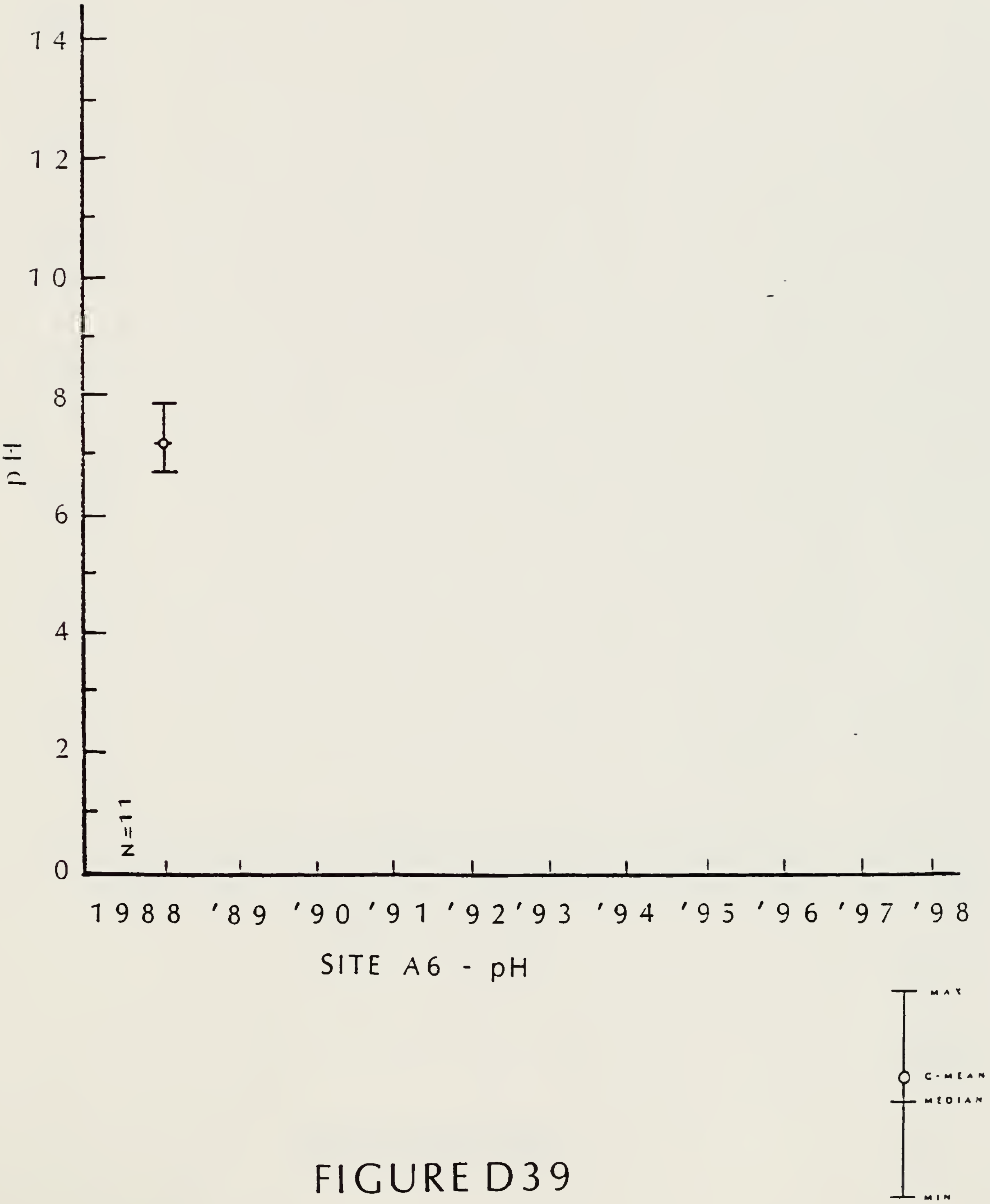
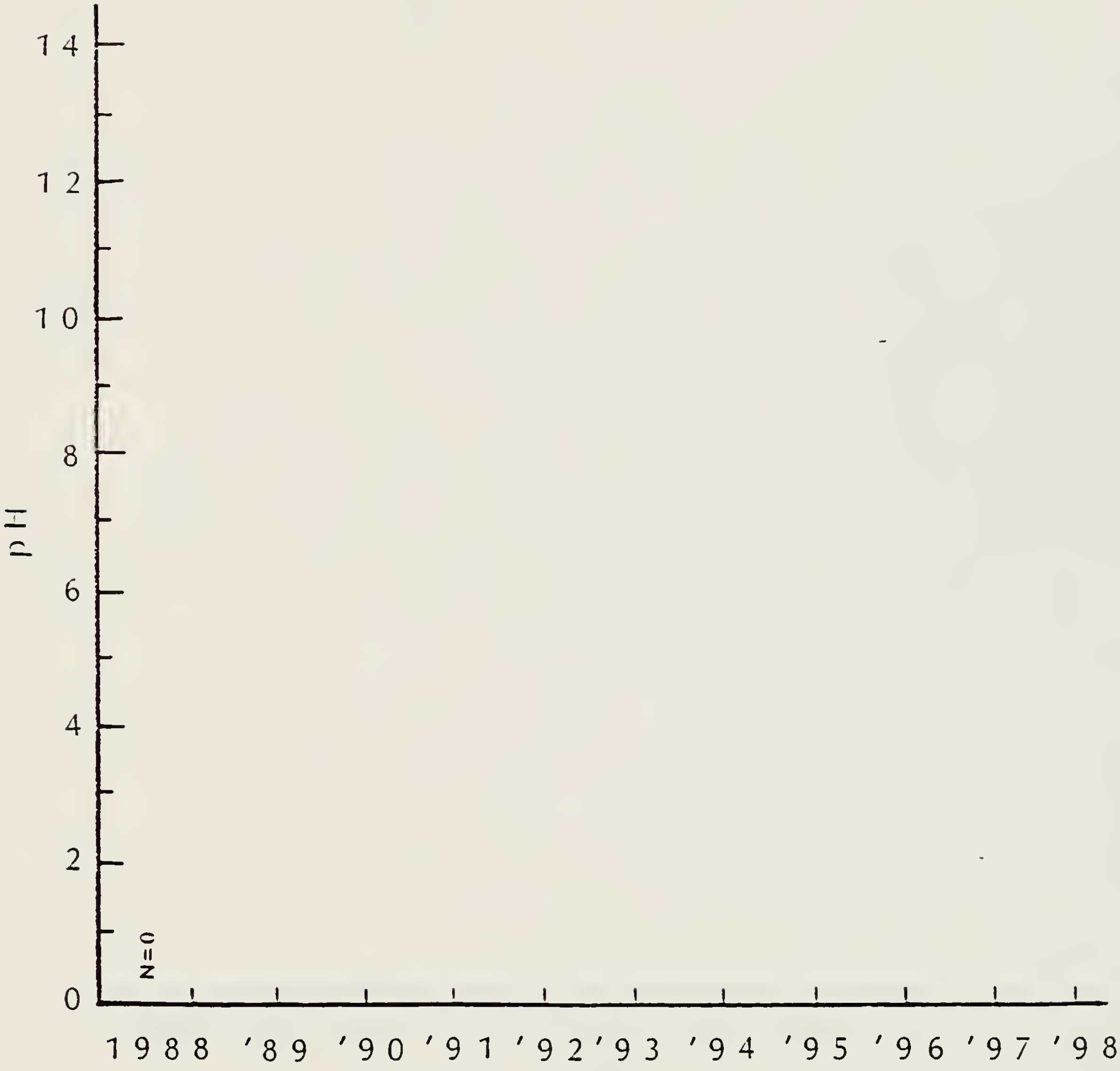
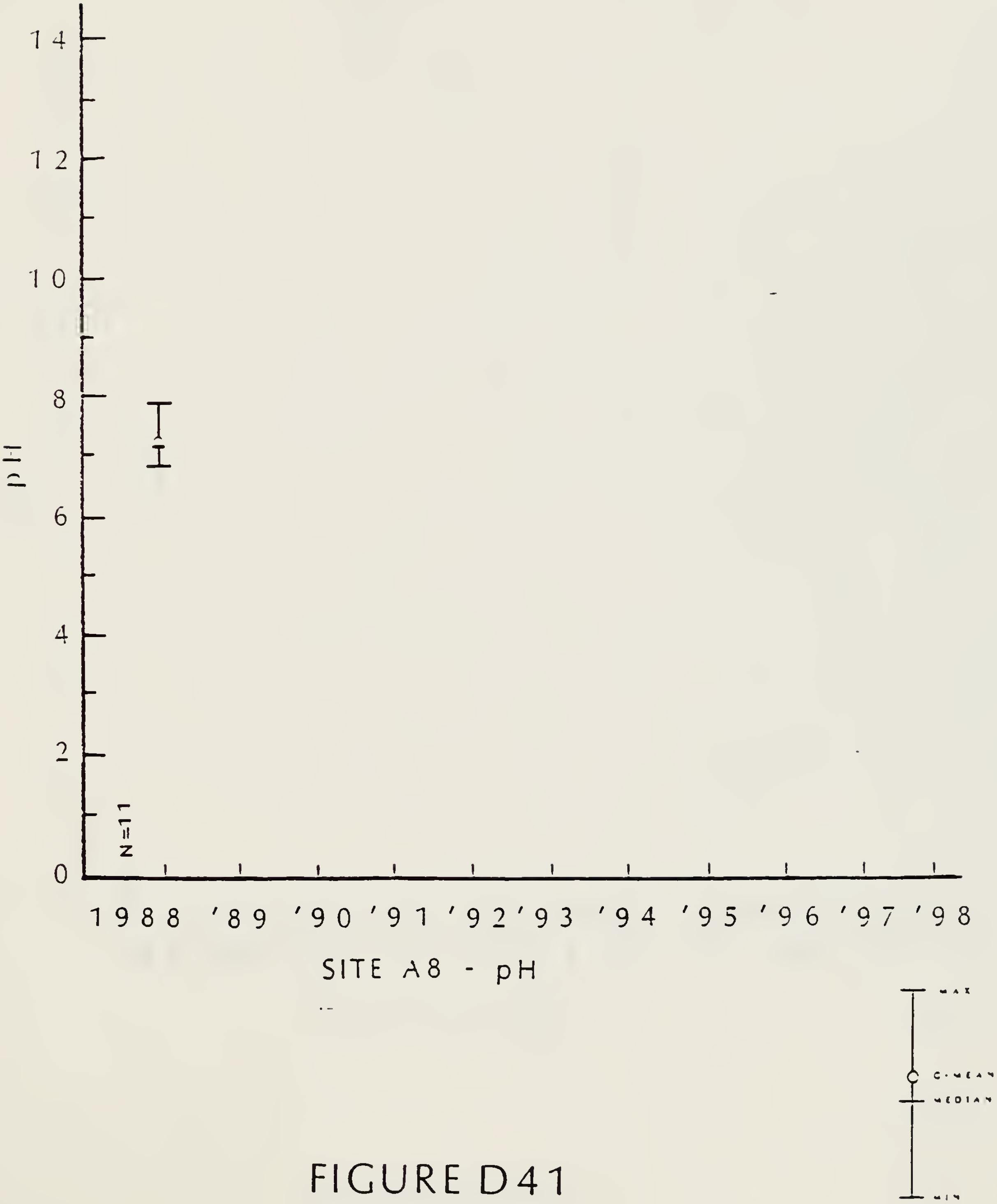

14
12
10
8
6
4
2
0
pH
N=11
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A6 - pH
MAX
C-MEAN
MEDIAN
MIN

FIGURE D39



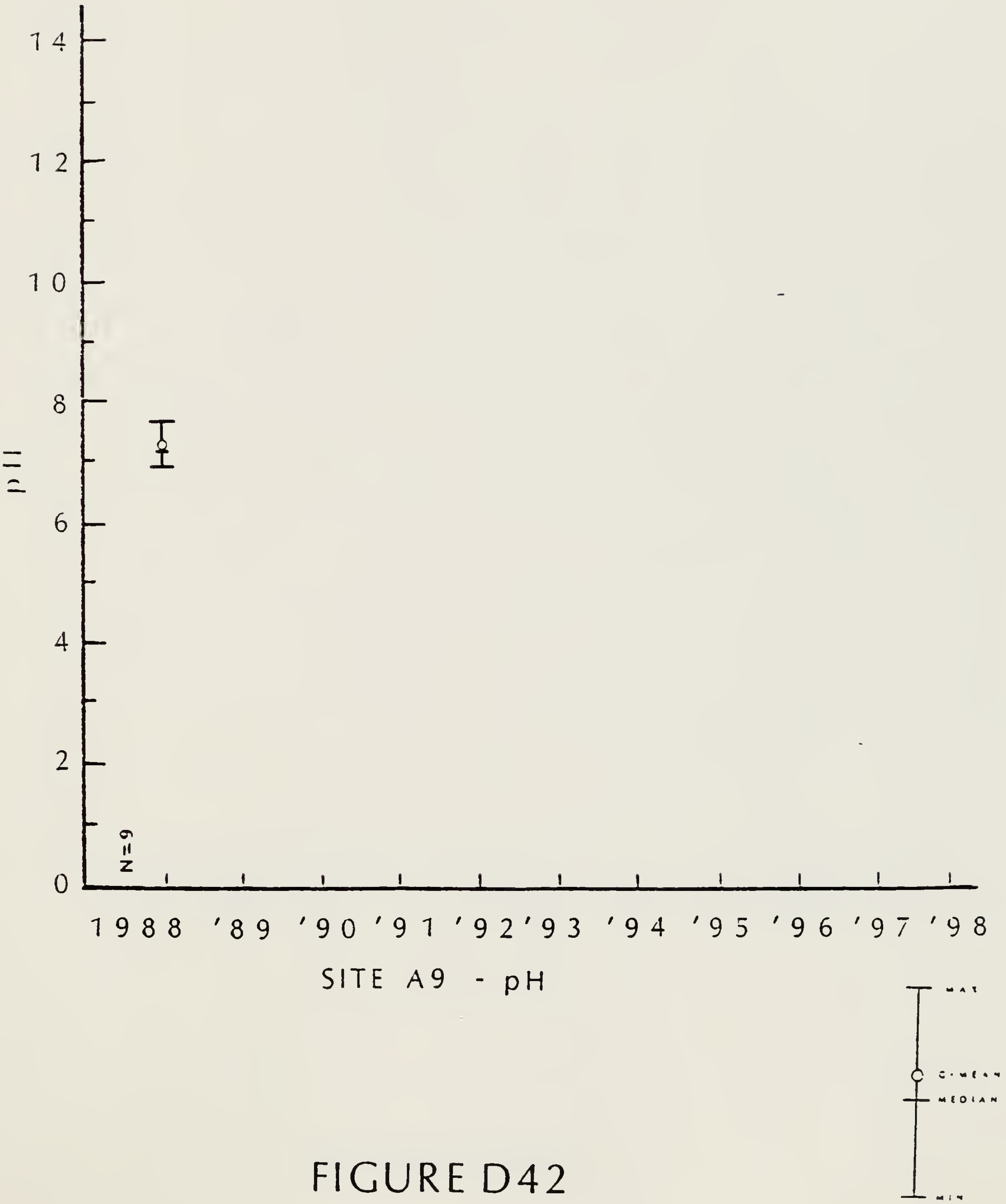
SITE A7 - pH

FIGURE D40



14
12
10
8
6
4
2
0
pH
N=11
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A8 - pH
MAX
MEAN
MEDIAN
MIN

FIGURE D41



14
12
10
8
6
4
2
0
pH
N=9
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A9 - pH
MAX
MEAN
MEDIAN
MIN

FIGURE D42

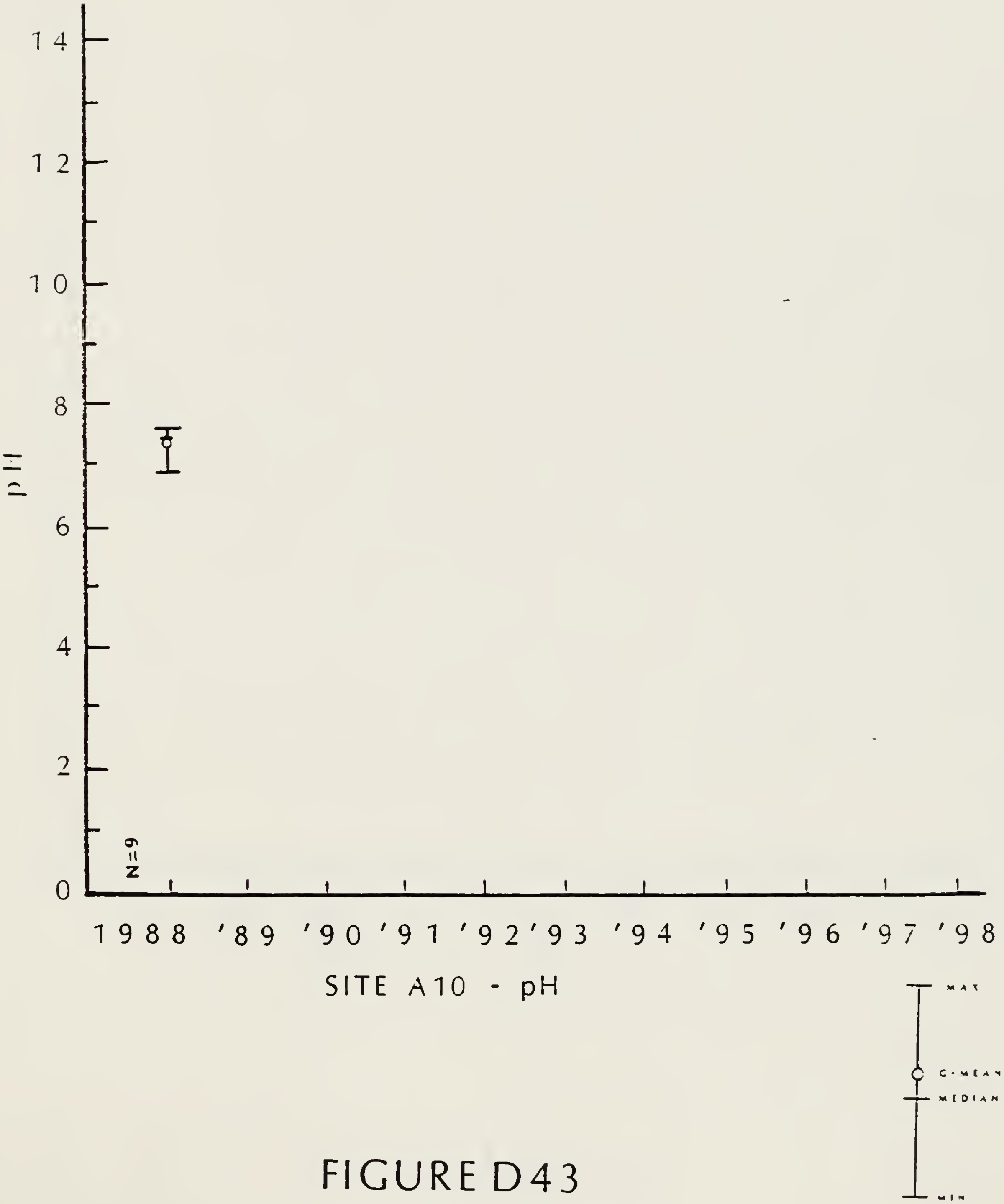

14
12
10
8
6
4
2
0
pH
N=9
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A10 - pH
MAX
G-MEAN
MEDIAN
MIN

FIGURE D43

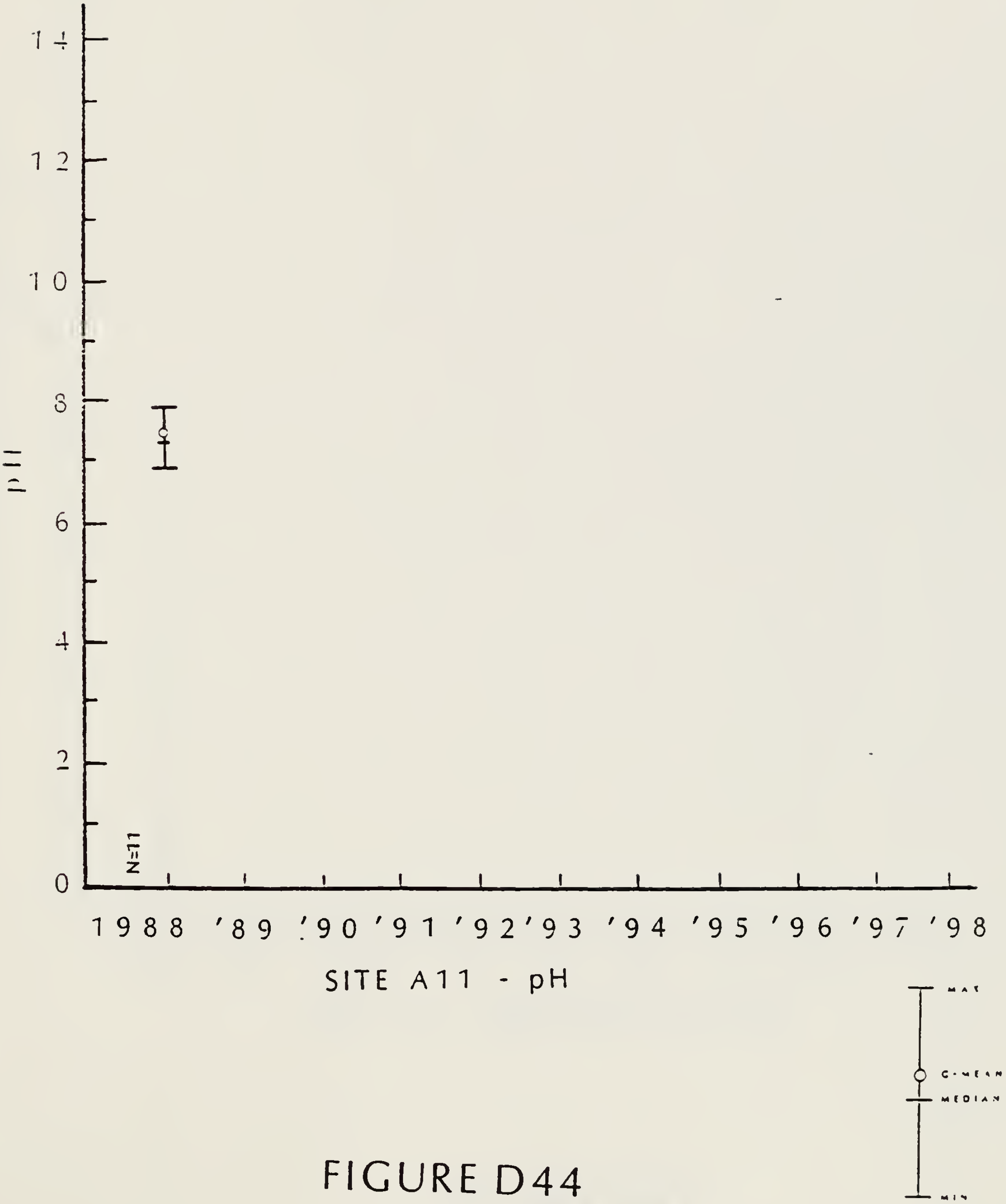
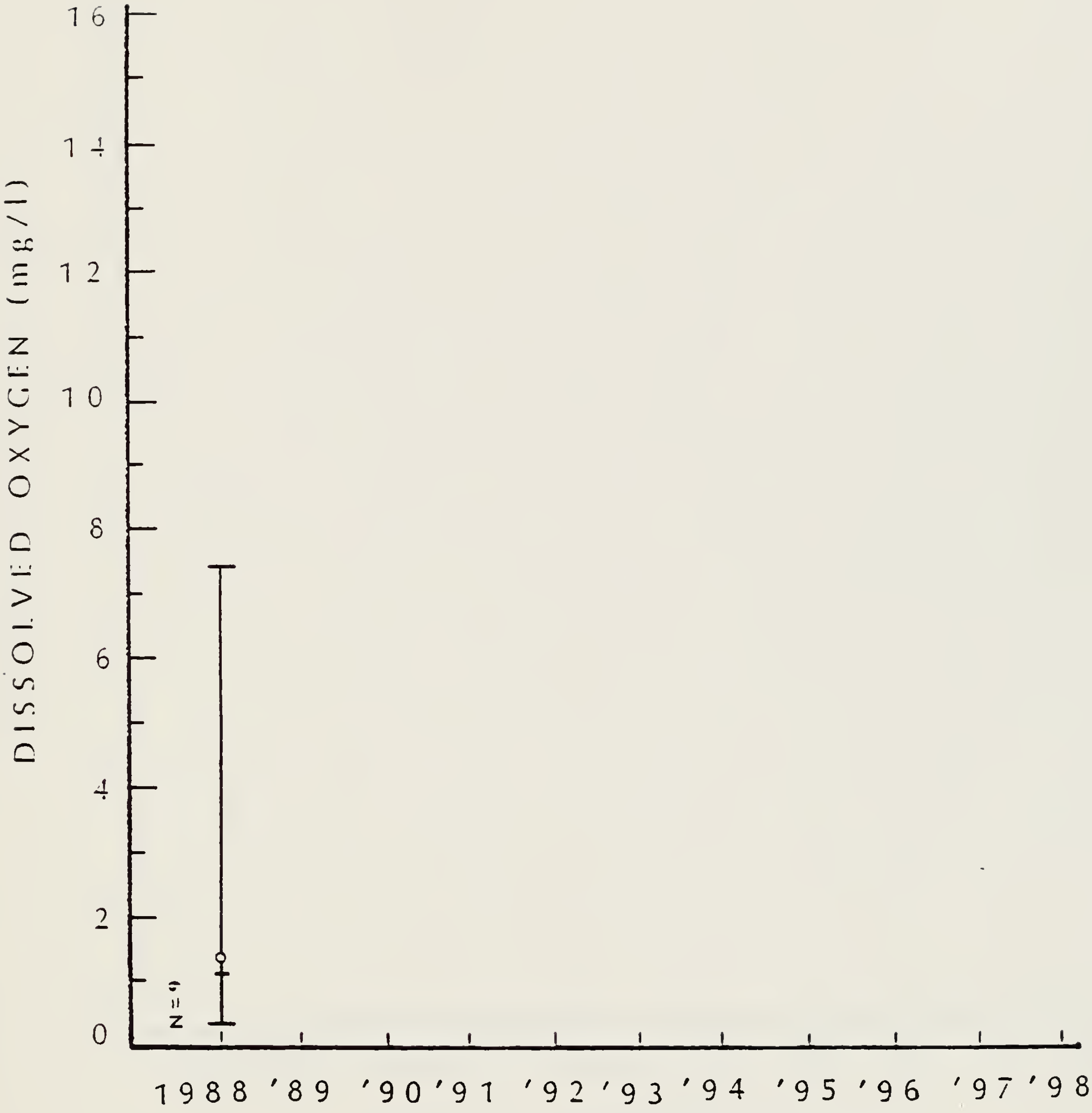

pH
14
12
10
8
6
4
2
0
N=11
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A11 - pH
MAX
G-MEAN
MEDIAN
MIN

FIGURE D44



SITE A1 - DISSOLVED OXYGEN

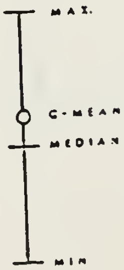
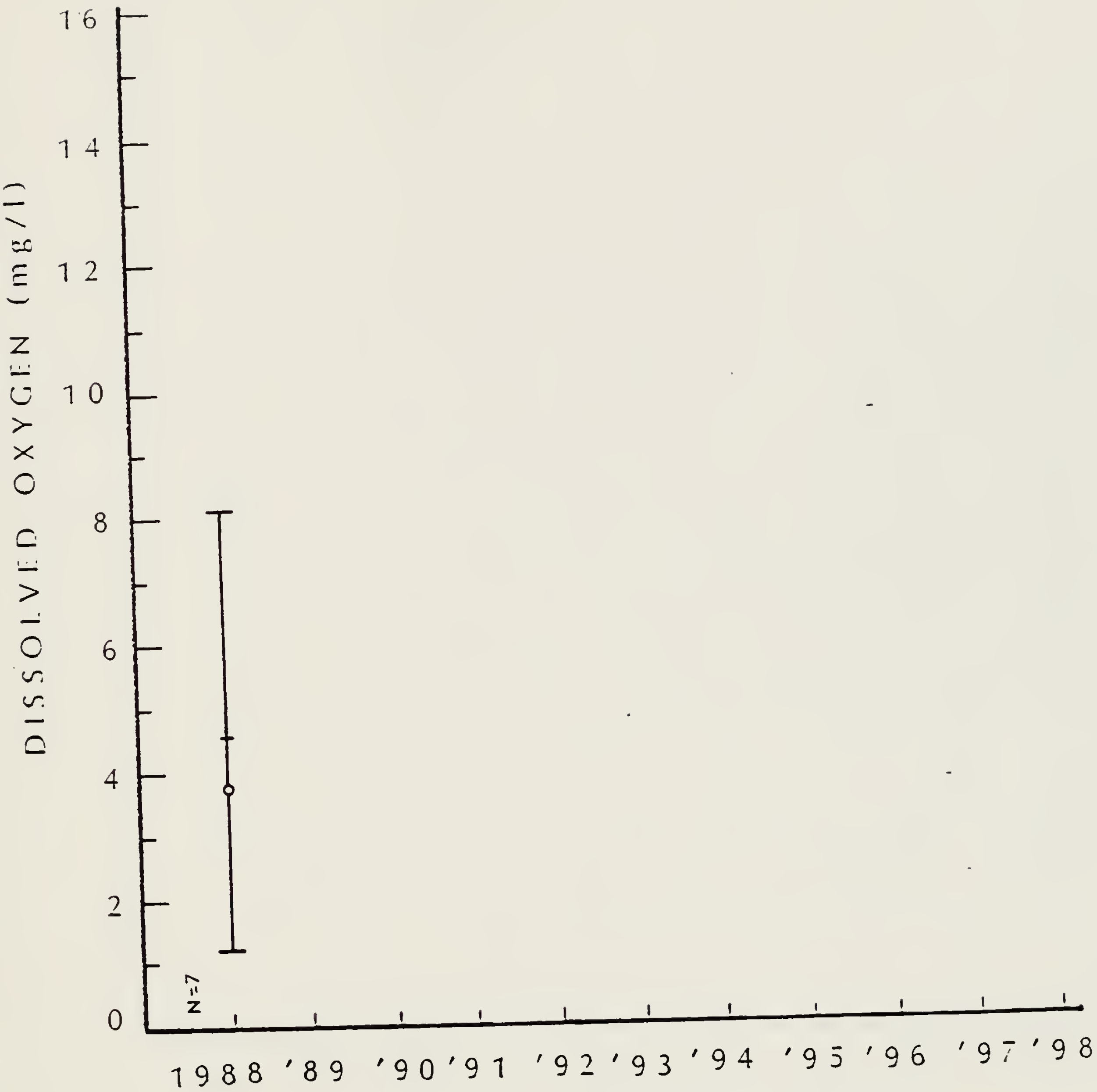


FIGURE D45



SITE A2 - DISSOLVED OXYGEN

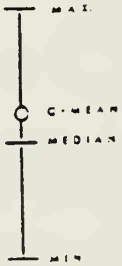


FIGURE D46

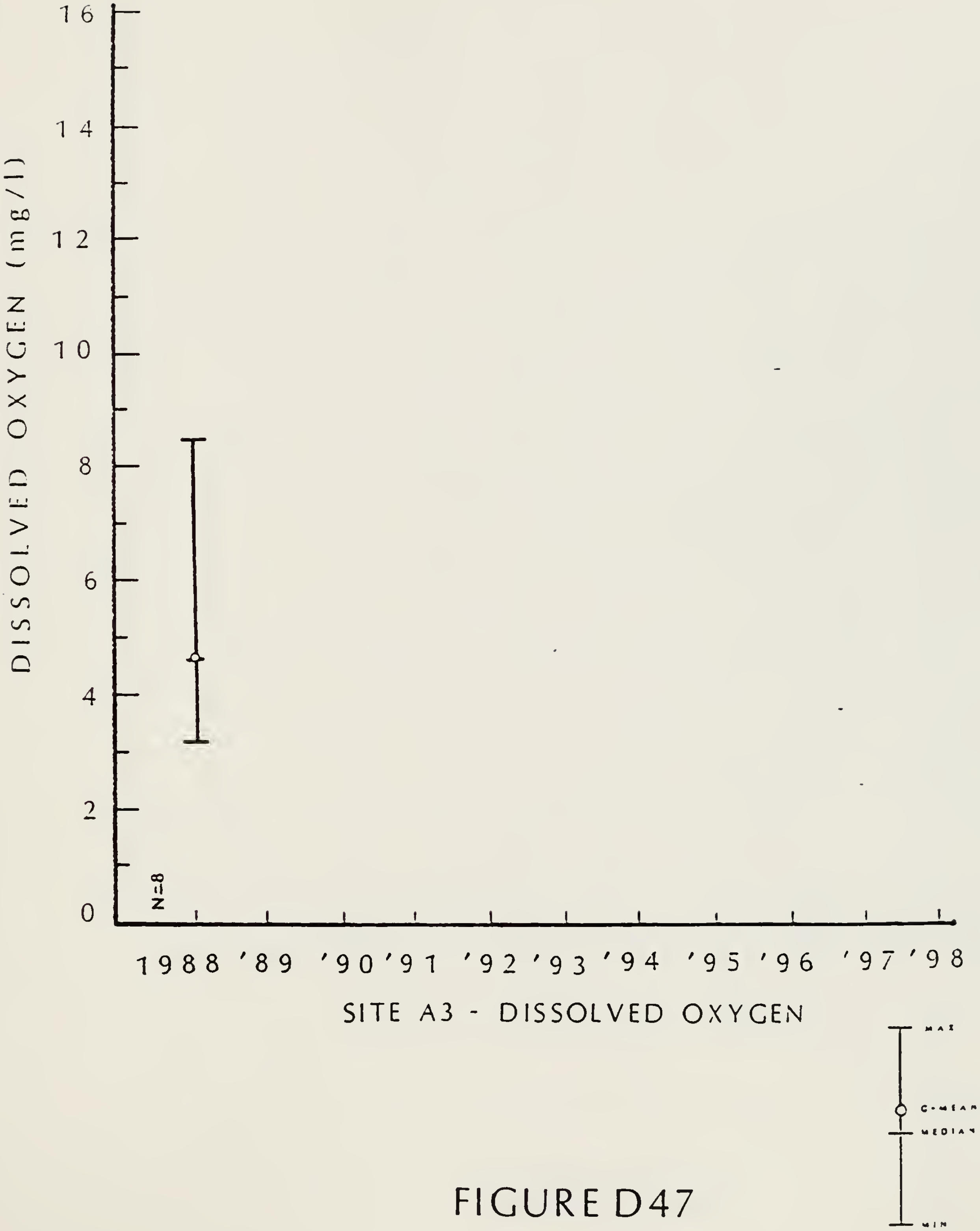
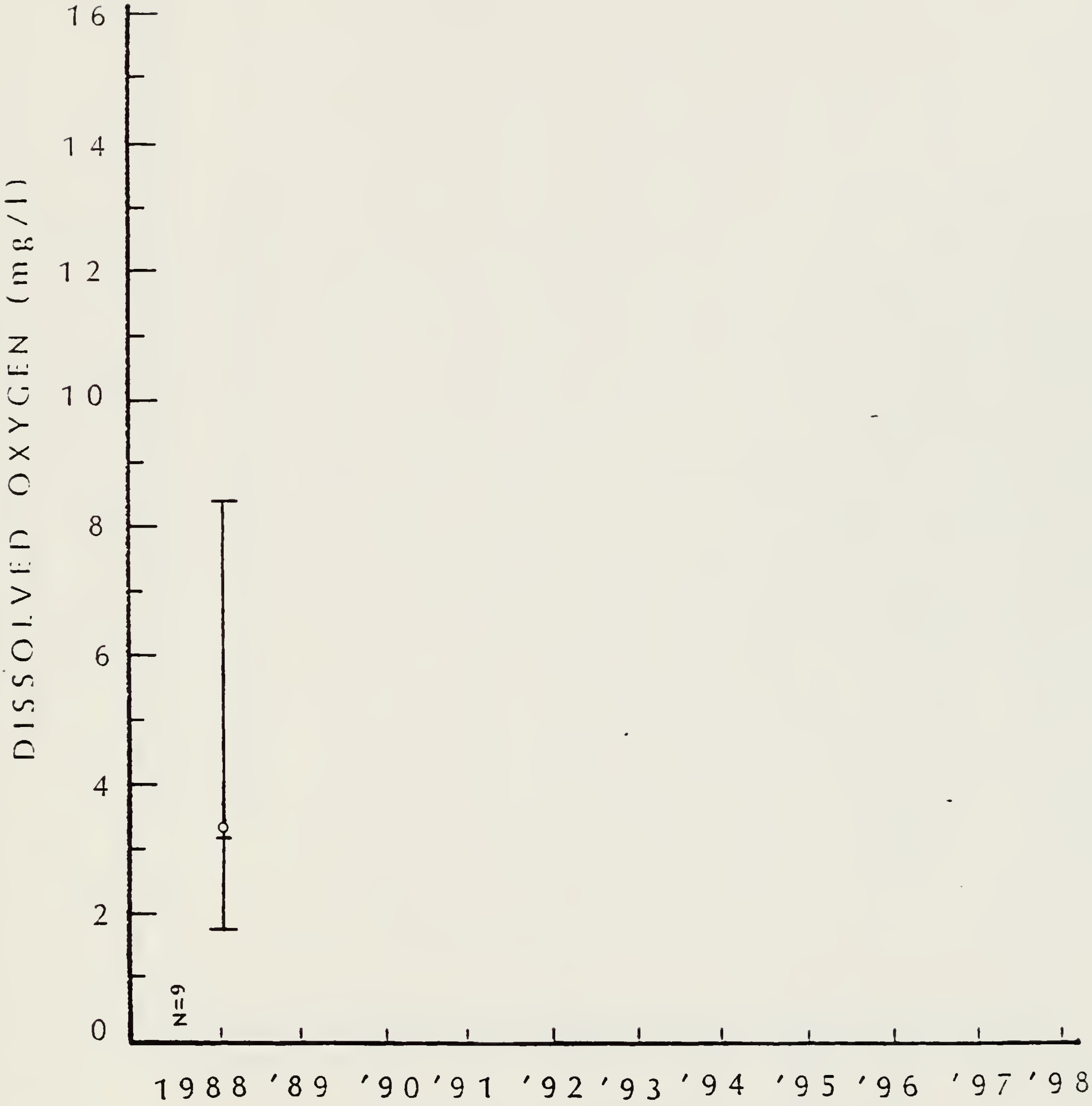

DISSOLVED OXYGEN (mg/l)
16
14
12
10
8
6
4
2
0
N=8
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A3 - DISSOLVED OXYGEN
MAX
G-MEAN
MEDIAN
MIN

FIGURE D47



SITE A4 - DISSOLVED OXYGEN

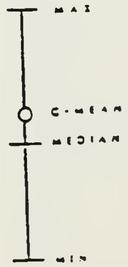
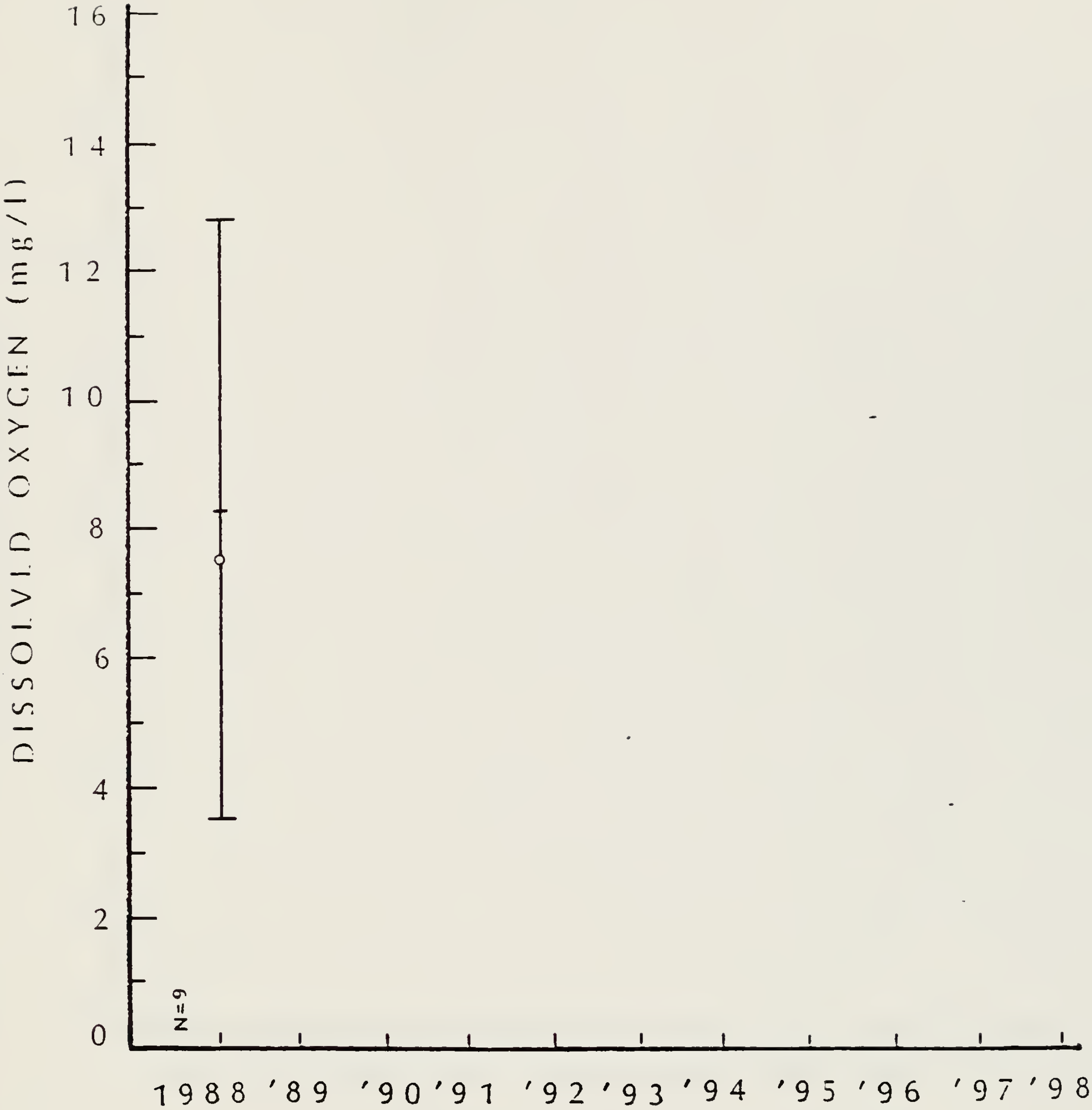


FIGURE D48



SITE A5 - DISSOLVED OXYGEN

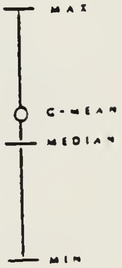


FIGURE D49

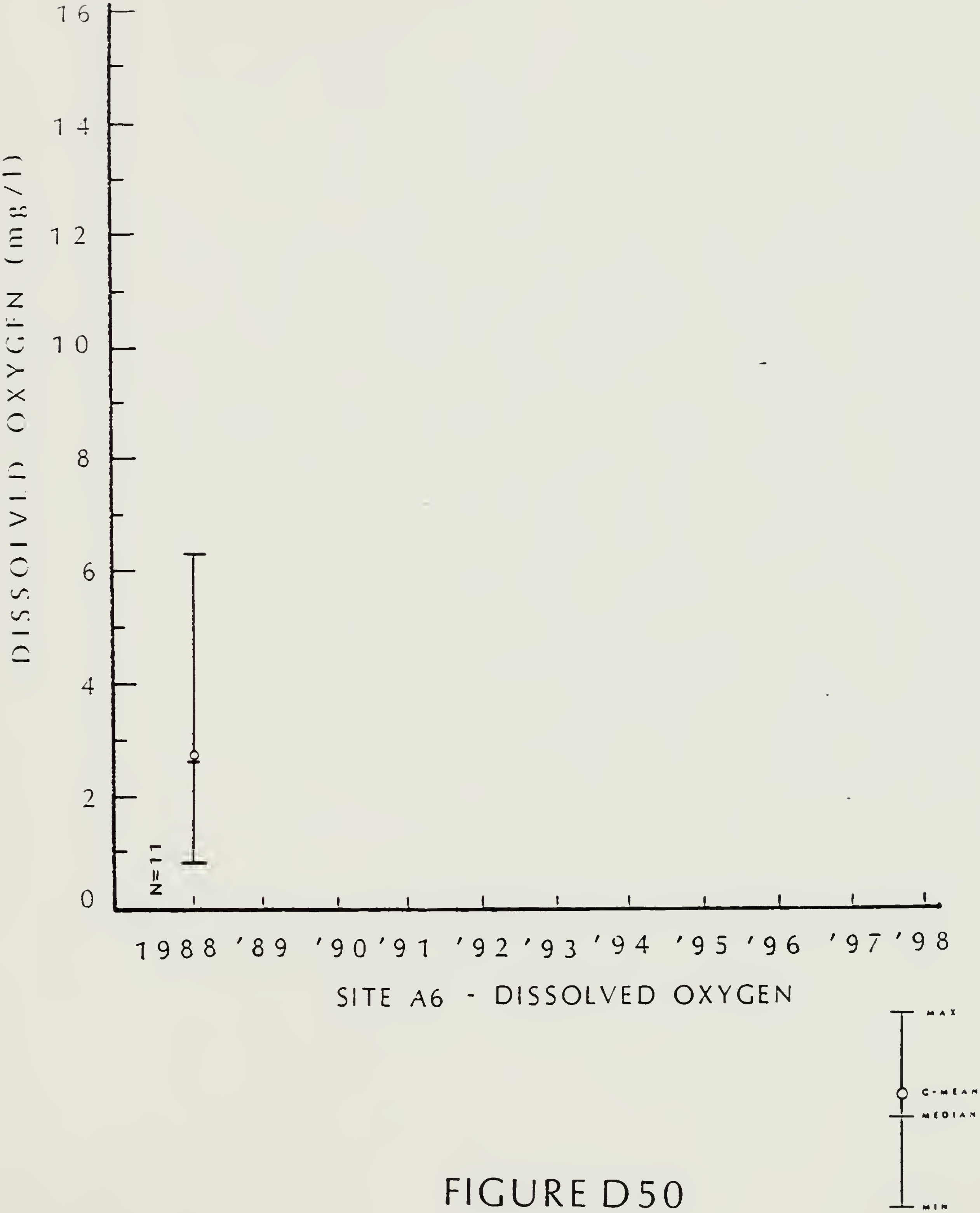

DISSOLVED OXYGEN (mg/l)
16
14
12
10
8
6
4
2
0
N=11
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A6 - DISSOLVED OXYGEN
MAX
C-MEAN
MEDIAN
MIN

FIGURE D50

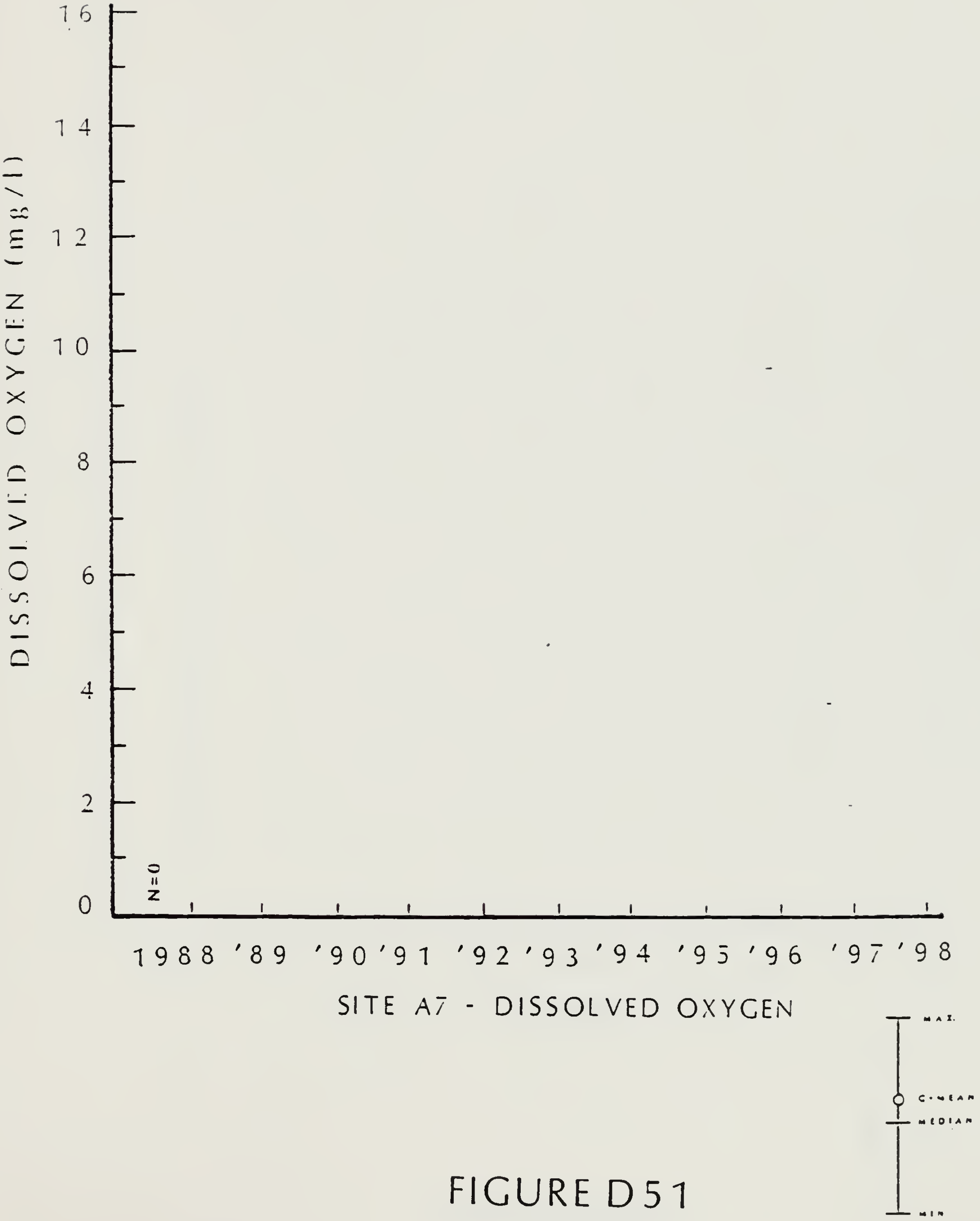
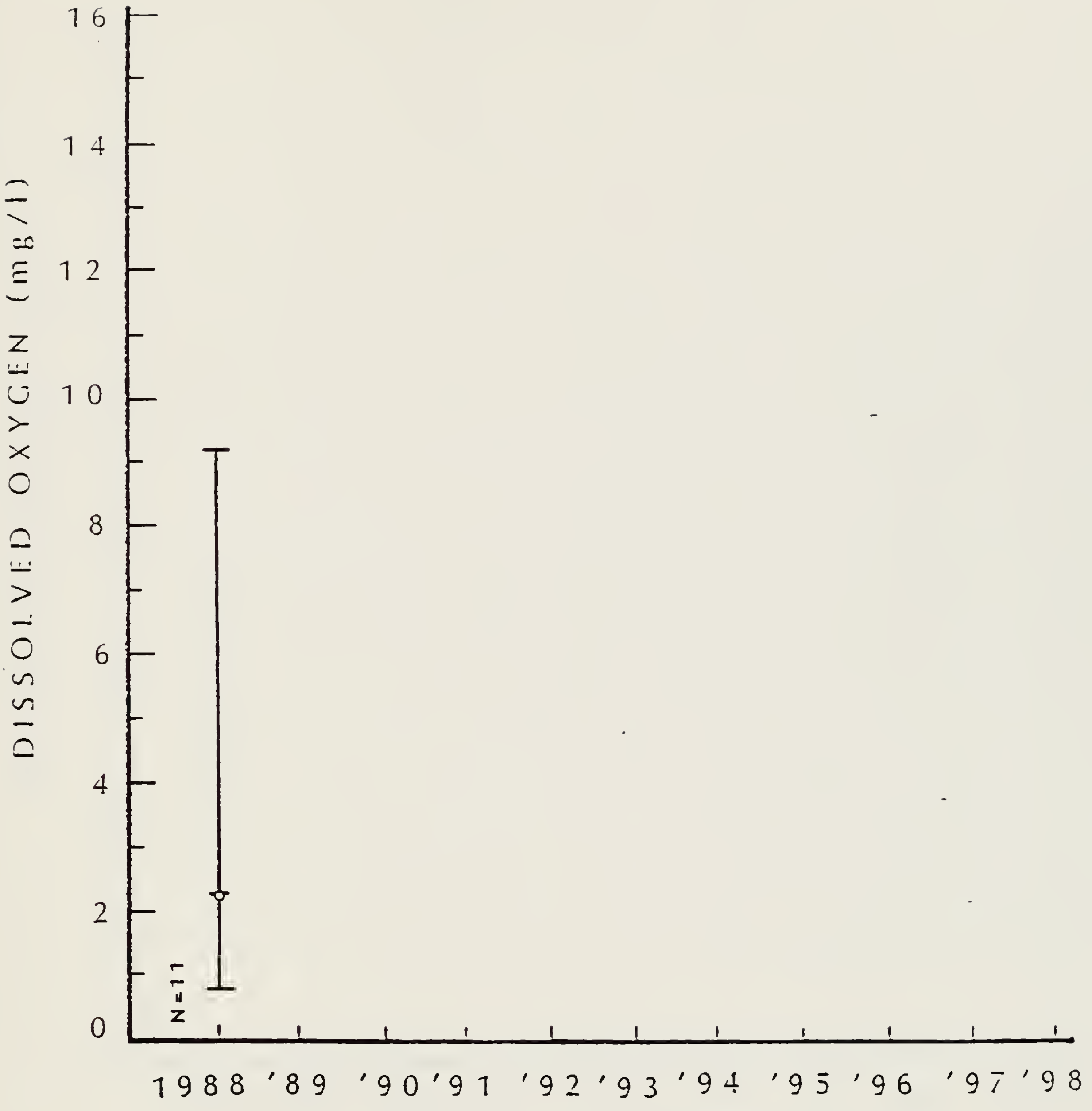

16
14
12
10
8
6
4
2
0
DISSOLVED OXYGEN (mg/l)
N=0
1988 '89 '90 '91 '92 '93 '94 '95 '96 '97 '98
SITE A7 - DISSOLVED OXYGEN
MAX.
MEAN
MEDIAN
MIN

FIGURE D51



SITE A8 - DISSOLVED OXYGEN

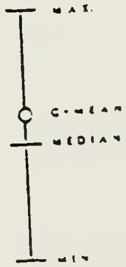


FIGURE D52

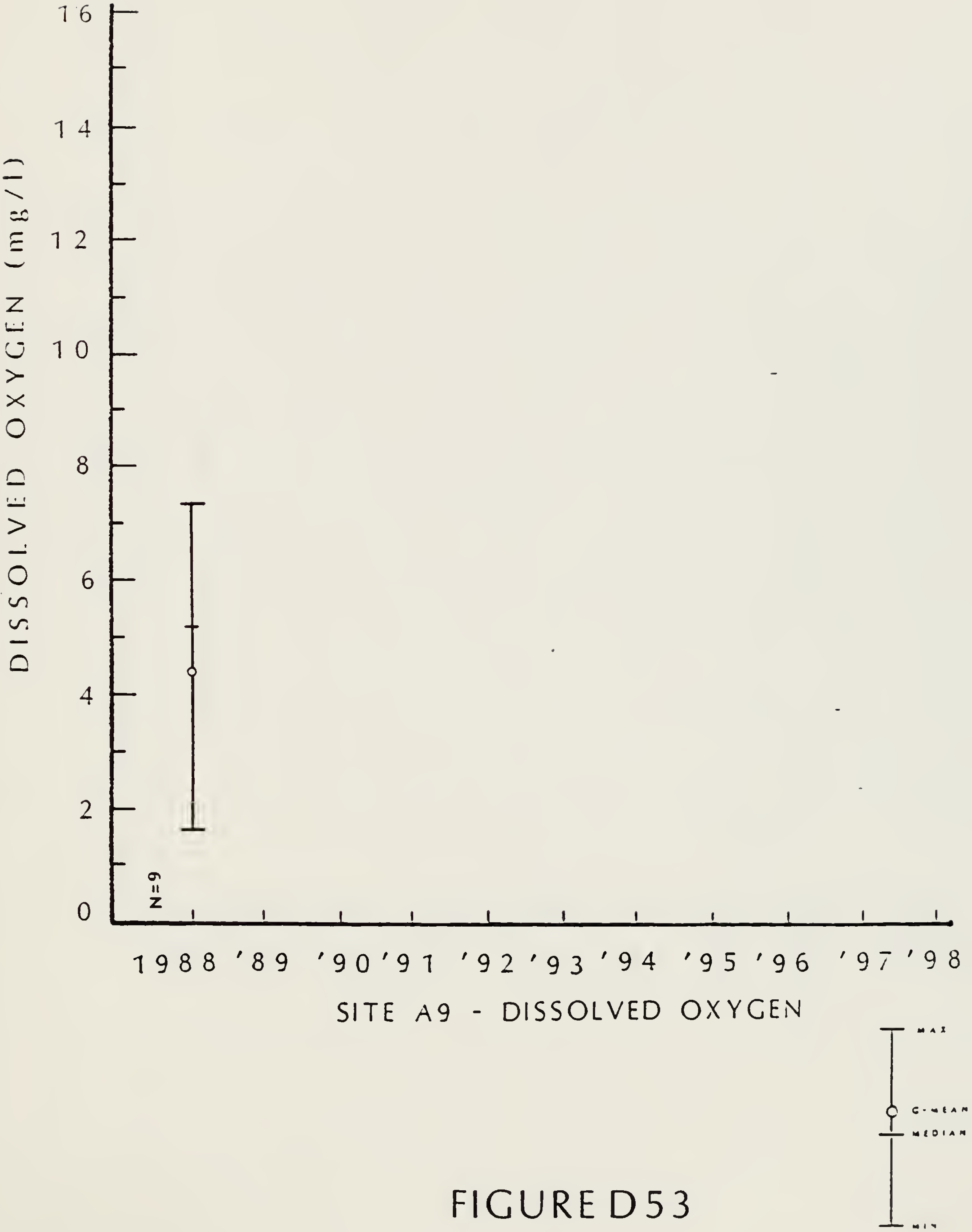
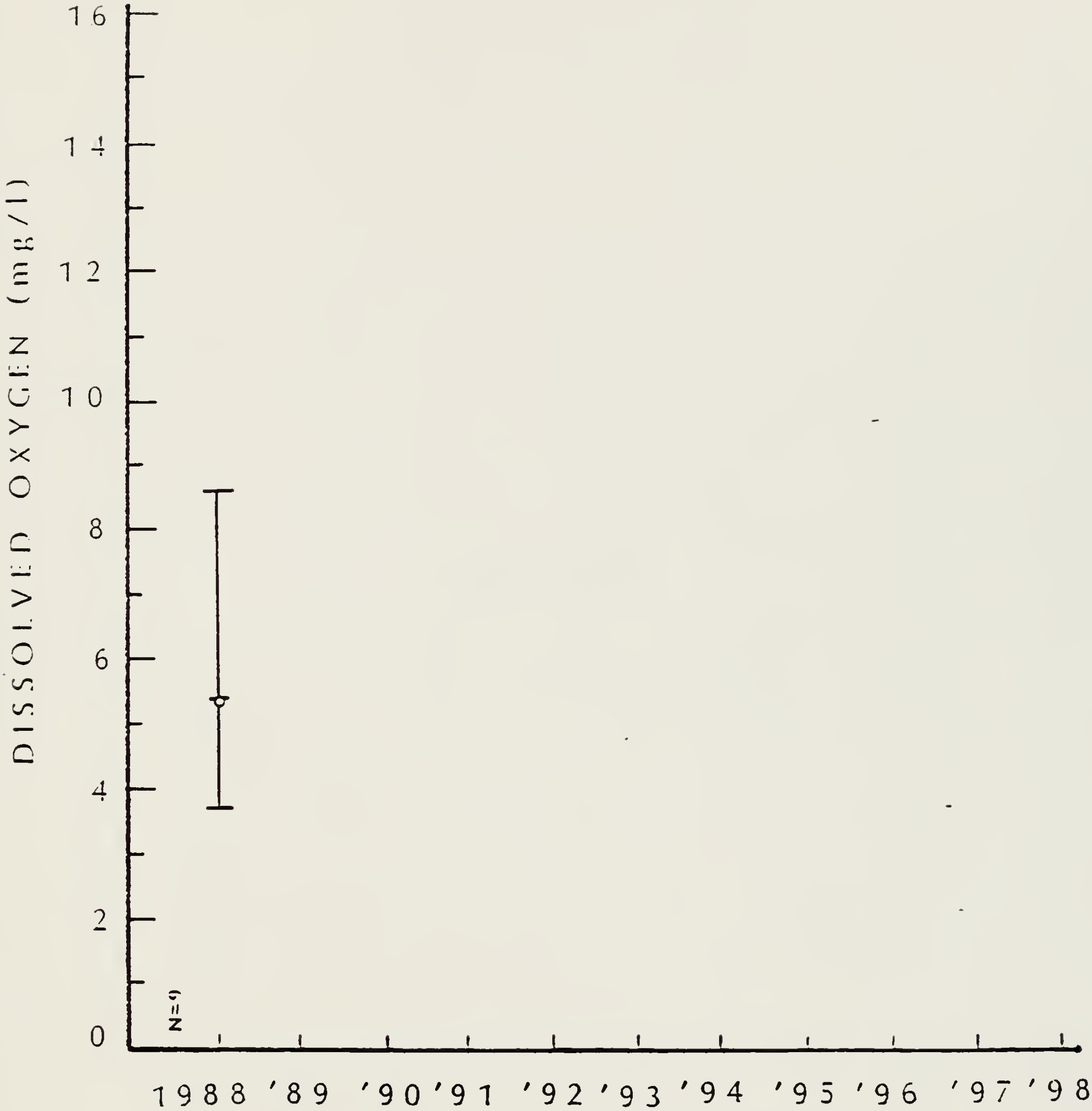

DISSOLVED OXYGEN (mg/l)
16
14
12
10
8
6
4
2
0
N=9
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A9 - DISSOLVED OXYGEN
MAX
G-MEAN
MEDIAN
MIN

FIGURE D53



SITE A10 - DISSOLVED OXYGEN

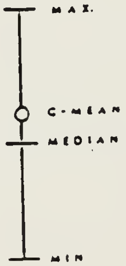


FIGURE D54

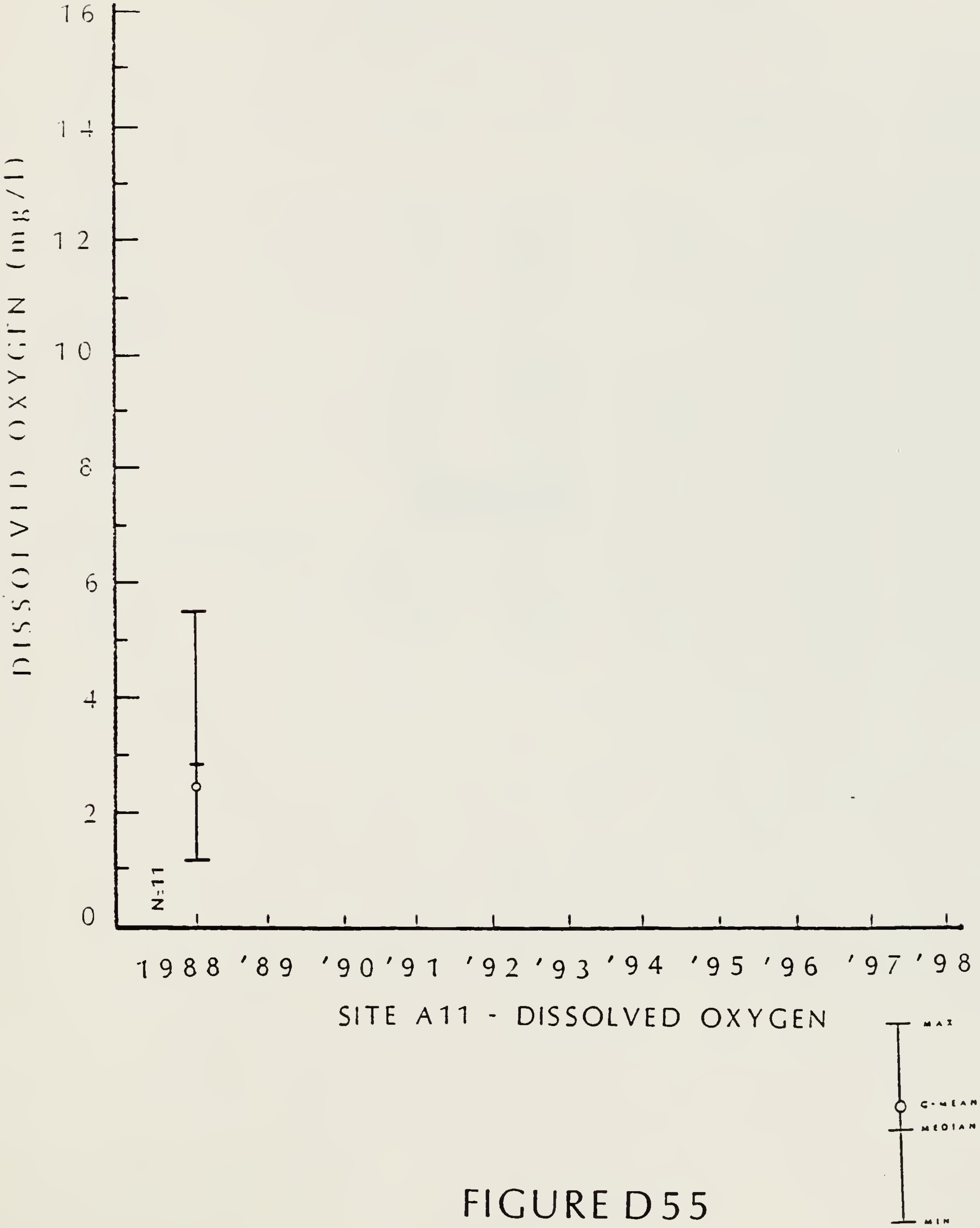

DISSOLVED OXYGEN (mg/l)
16
14
12
10
8
6
4
2
0
N=11
1988
'89
'90
'91
'92
'93
'94
'95
'96
'97
'98
SITE A11 - DISSOLVED OXYGEN
MAX
G-MEAN
MEDIAN
MIN

FIGURE D55

APPENDIX E

NUTRIENT and METAL PARAMETERS
(all concentrations in mg/l)

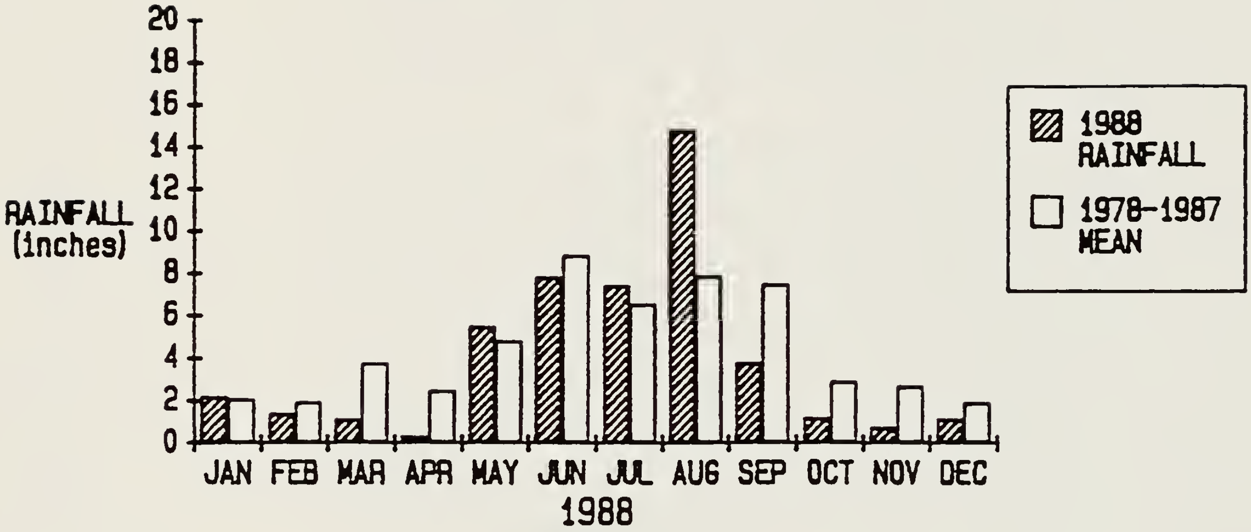
BIG CYPRESS NATIONAL PRESERVE - 1988

PARAMETER	N-VALUE	MAX	MIN	MEDIAN	DET.LIMIT	METHOD
Nutrients:						
NO2	25	0.03	0.00	0.00	0.02	EPA 354.1
NO3	25	0.88	0.00	0.00	0.02	EPA 353.3
NH3	25	0.016	0.000	0.000	0.005	EPA 351.2
OPO4	25	2.00	0.00	0.03	0.02	EPA 365.2
Metals:						
As	7	0.000	0.000	0.000	0.005	EPA 206.3
Cd	7	0.000	0.000	0.000	0.002	EPA 213.1
Cu	7	0.028	0.000	0.009	0.005	EPA 220.1
Pb	7	0.04	0.00	0.00	0.01	EPA 239.1
Hg	7	0.0006	0.0000	0.0000	0.0002	EPA 245.1
Zn	7	0.028	0.000	0.000	0.005	EPA 289.1
Other parameters:						
Ca++	25	89.000	10.700	55.000	0.005	EPA 215.1
Cl-	25	118.0	11.0	29.0	0.5	EPA 325.3
Mg++	25	17.00	1.100	4.200	0.005	EPA 242.1
Na++	25	54.000	6.000	17.000	0.005	EPA 273.1

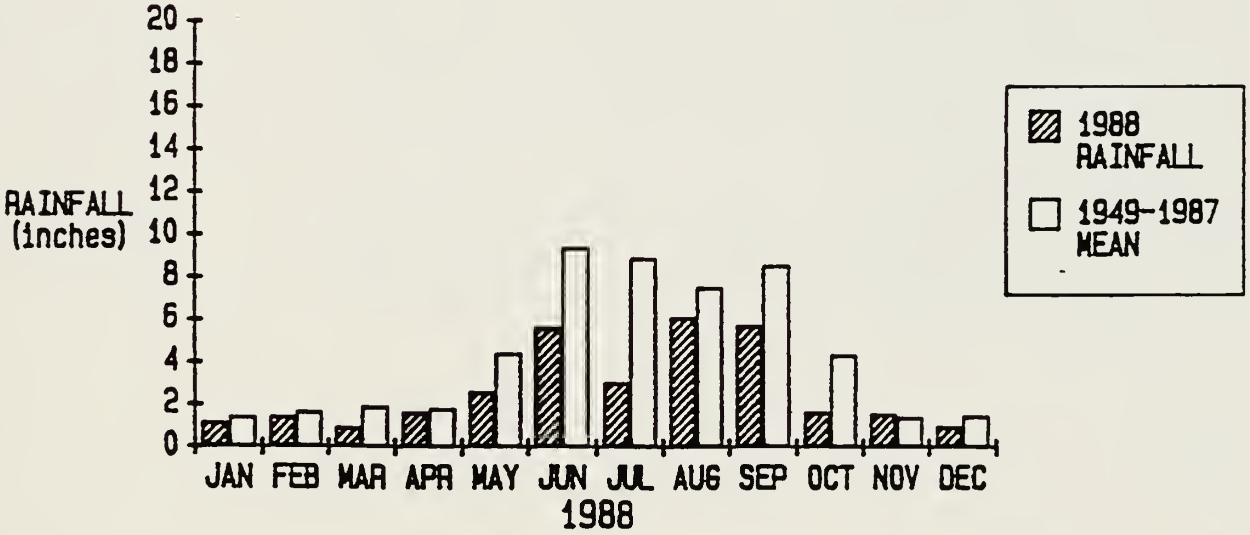
FIGURE E1

APPENDIX F

OASIS RANGER STATION



EVERGLADES CITY RANGER STATION



(from Everglades Synopsis, 1988)

FIGURE F1

APPENDIX G

```
NAME-------------------- SITE DATE---- TIME STAFF TEMP COND PH--- DO--- TURB--  NO3--- OPO4-- NH4--- ALK

** BRIDGE 105                                                                   ** BRIDGE 105
BRIDGE 105               A6   02/23/88 1615  7.80 21.5  360  7.25  4.20   0.00  0.000  0.000  0.000 175
BRIDGE 105               A6   03/22/88 1100  7.40 19.3  395  7.32  3.87   0.00  0.000  0.000  0.000 206
BRIDGE 105               A6   04/20/88 1230  5.56 28.0  460  7.54  5.95   0.00  0.000  0.000  0.000 206
BRIDGE 105               A6   05/18/88 1001  5.42 25.0  475  7.17  2.94   0.00  0.000  0.000  0.000 195
BRIDGE 105               A6   06/23/88 1130  8.28 27.5  172  6.72  2.55   0.00  0.000  0.000  0.000  65
BRIDGE 105               A6   07/13/88 1025  8.18 27.0  213  7.04  2.30   0.00  0.000  0.000  0.000  85
BRIDGE 105               A6   08/17/88 1105  8.52 28.0  225  6.70  2.81   0.00  0.000  0.000  0.000  92
BRIDGE 105               A6   09/14/88 1120  8.30 29.5  335  7.93  2.09   0.00  0.000  0.000  0.000 125
BRIDGE 105               A6   10/12/88 1040  8.02 25.0  315  7.09  2.31   0.00  0.000  0.000  0.000 137
BRIDGE 105               A6   11/15/88 1015  7.54 24.0  405  7.15  0.91   0.00  0.000  0.000  0.000 137
BRIDGE 105               A6   12/20/88 1200  6.92 19.0  410  7.24  6.37   0.00  0.000  0.000  0.000 216

** BRIDGE 83                                                                    ** BRIDGE 83
BRIDGE 83                A8   02/23/88 1215 -1.00 21.0 2200  7.95  3.51   0.00  0.000  0.000  0.000 215
BRIDGE 83                A8   03/21/88 1200 -1.00 21.1 2200  7.32  9.20   0.00  0.000  0.000  0.000 239
BRIDGE 83                A6   04/20/88 1340 -1.00 27.5 1650  7.37  1.39   0.00  0.000  0.000  0.000 247
BRIDGE 83                A8   05/18/88 1130 -1.00 24.0 2050  7.25  1.32   0.00  0.000  0.000  0.000 260
BRIDGE 83                A8   06/23/88 1305 -1.00 27.0  800  7.08  2.30   0.00  0.000  0.000  0.000 139
BRIDGE 83                A8   07/13/88 1205 -1.00 26.5 1025  6.83  3.30   0.00  0.000  0.000  0.000 185
BRIDGE 83                A8   08/17/88 1000 -1.00 26.0  350  6.91  1.02   0.00  0.000  0.000  0.000 140
BRIDGE 83                A8   09/19/88  930 -1.00 27.0  385  7.15  0.83   0.00  0.000  0.000  0.000 157
BRIDGE 83                A8   10/12/88 1125 -1.00 24.0  600  6.95  1.14   0.00  0.000  0.000  0.000 220
BRIDGE 83                A8   11/15/88  830 -1.00 23.0  630  7.80  2.94   0.00  0.000  0.000  0.000 190
BRIDGE 83                A8   12/20/88 1420 -1.00 16.0  410  7.99  7.18   0.00  0.000  0.000  0.000 206

** BRIDGE 84                                                                    ** BRIDGE 84
BRIDGE 84                A7   02/23/88 1200  3.38 22.5  442 -1.00 -1.00   0.00  0.000  0.000  0.000  -1
BRIDGE 84                A7   03/21/88 1530  3.10 22.5  410 -1.00 -1.00   0.00  0.000  0.000  0.000  -1
BRIDGE 84                A7   04/20/88 1055  1.38 28.0  300 -1.00 -1.00   0.00  0.000  0.000  0.000  -1
BRIDGE 84                A7   05/18/88 1230  1.74 29.0  265 -1.00 -1.00   0.00  0.000  0.000  0.000  -1
BRIDGE 84                A7   06/23/88 1325  3.52 29.0  325 -1.00 -1.00   0.00  0.000  0.000  0.000  -1
BRIDGE 84                A7   07/15/88 1130  3.93 27.0  300 -1.00 -1.00   0.00  0.000  0.000  0.000  -1
BRIDGE 84                A7   08/19/88 1130  4.50 29.5  235 -1.00 -1.00   0.00  0.000  0.000  0.000  -1
BRIDGE 84                A7   09/19/88  920  4.16 27.5  290 -1.00 -1.00   0.00  0.000  0.000  0.000  -1
BRIDGE 84                A7   10/12/88 1115  3.58 24.0  340 -1.00 -1.00   0.00  0.000  0.000  0.000  -1
BRIDGE 84                A7   11/15/88 1300  3.04 25.0  330 -1.00 -1.00   0.00  0.000  0.000  0.000  -1
BRIDGE 84                A7   12/20/88 1410  3.00 15.0  325 -1.00 -1.00   0.00  0.000  0.000  0.000  -1

** EAST CROSSING STRAND                                                         ** EAST CROSSING STRAND
EAST CROSSING STRAND     A3   02/22/88 1115 -1.00 16.0  470  6.95  3.15   0.00  0.000  0.050  0.000 250
EAST CROSSING STRAND     A3   03/23/88 1025 -1.00 20.0  570  7.23  7.60   0.00  0.000  0.000  0.000 240
EAST CROSSING STRAND     A3   07/13/88  945 -1.00 28.5  229  7.54  5.09   0.00  0.000  0.000  0.000  67
EAST CROSSING STRAND     A3   08/18/88 1030 -1.00 27.0  285  7.18  3.26   0.00  0.000  0.030  0.000 117
EAST CROSSING STRAND     A3   09/15/88  945 -1.00 29.0  365  7.10  3.71   0.00  0.000  0.000  0.000 142
EAST CROSSING STRAND     A3   10/11/88 1000 -1.00 25.0  295  7.53  4.43   0.00  0.050  0.030  0.000 153
EAST CROSSING STRAND     A3   11/16/88  930 -1.00 25.0  328  7.79  4.89   0.00  0.000  0.000  0.000 155
EAST CROSSING STRAND     A3   12/19/88 1130 -1.00 13.5  425  7.89  8.58   0.00  0.120  0.020  0.000 202

** EAST HINSON MARSH.                                                           ** EAST HINSON MARSH
EAST HINSON MARSH        A2   02/22/88 1040 -1.00 21.0  321  7.40  8.07   0.00  0.000  0.000  0.000 178
EAST HINSON MARSH        A2   03/23/88  950 -1.00 18.1  500  7.25  5.90   0.00  0.000  0.000  0.000 231
EAST HINSON MARSH        A2   04/19/88  930 -1.00 27.0  520  7.95  4.41   0.00  0.000  0.000  0.000 235
EAST HINSON MARSH        A2   08/18/88  930 -1.00 26.5  650  7.29  1.68   0.00  0.000  0.000  0.000 260
EAST HINSON MARSH        A2   09/15/88  915  3.95 27.0  490  7.22  1.20   0.00  0.000  0.000  0.000 178
EAST HINSON MARSH        A2   10/11/88  940 -1.00 24.0  530  7.11  6.30   0.00  0.000  0.000  0.000 268
EAST HINSON MARSH        A2   11/16/88 1020 -1.00 26.0  380  7.50  4.76   0.00  0.000  0.000  0.000 197
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FIGURE G1

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NAME-------------------- CL---- NA---- CA---- MG---- CU----- PB----- CD----- AS----- ZN------ NO2--- HG------ NUT MET

** BRIDGE 105                                                                ** BRIDGE 105
BRIDGE 105                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 105                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 105                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 105                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 105                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 105                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 105                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 105                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 105                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 105                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 105                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N

** BRIDGE 83                                                                 ** BRIDGE 83
BRIDGE 83                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 83                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 83                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 83                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 83                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 83                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 83                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 83                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 83                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 83                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 83                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N

** BRIDGE 84                                                                 ** BRIDGE 84
BRIDGE 84                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 84                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 84                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 84                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 84                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 84                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 84                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 84                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 84                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 84                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
BRIDGE 84                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N

** EAST CROSSING STRAND                                                      ** EAST CROSSING STRAND
EAST CROSSING STRAND     49.00 54.000 89.000  9.700  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 Y   N
EAST CROSSING STRAND      0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
EAST CROSSING STRAND      0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
EAST CROSSING STRAND     13.00  8.000 45.000  5.200  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 Y   N
EAST CROSSING STRAND      0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
EAST CROSSING STRAND     27.00 16.000 53.000  5.400  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 Y   N
EAST CROSSING STRAND      0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
EAST CROSSING STRAND     52.00 27.000 64.000  8.100  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 Y   N

** EAST HINSON MARSH                                                         ** EAST HINSON MARSH
EAST HINSON MARSH        49.00 23.000 64.000  6.600  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 Y   N
EAST HINSON MARSH         0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
EAST HINSON MARSH         0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
EAST HINSON MARSH         0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
EAST HINSON MARSH         0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
EAST HINSON MARSH         0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
EAST HINSON MARSH         0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000 N   N
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FIGURE G1 (CONT)

NAME	SITE	DATE	TIME	STAFF	TEMP	COND	PH	DO	TURB	NO3	OPO4	NH4	ALK
** GUM SLOUGH										** GUM SLOUGH			
GUM SLOUGH	A10	02/22/88	1320	1.96	18.0	390	7.61	8.61	0.00	0.000	0.000	0.000	182
GUM SLOUGH	A10	03/23/88	1218	1.43	17.0	442	7.42	6.76	0.00	0.000	0.000	0.000	212
GUM SLOUGH	A10	04/19/88	1130	0.10	-1.0	-1	-1.00	-1.00	0.00	0.000	0.000	0.000	-1
GUM SLOUGH	A10	05/17/88	1020	-1.00	-1.0	-1	-1.00	-1.00	0.00	0.000	0.000	0.000	-1
GUM SLOUGH	A10	06/22/88	1220	2.23	30.2	221	7.42	5.73	0.00	0.020	0.040	0.000	95
GUM SLOUGH	A10	07/13/88	1125	2.02	30.0	310	7.53	4.40	0.00	0.000	0.020	0.000	115
GUM SLOUGH	A10	08/18/88	1015	2.29	29.5	250	7.22	5.35	0.00	0.000	0.000	0.000	104
GUM SLOUGH	A10	09/15/88	1122	2.22	28.3	298	7.12	3.81	0.00	0.000	0.000	0.000	120
GUM SLOUGH	A10	10/11/88	1125	2.04	25.0	270	6.95	4.57	0.00	0.020	0.020	0.000	125
GUM SLOUGH	A10	11/21/88	1140	-1.00	24.0	252	7.66	6.22	-1.00	0.200	0.200	0.000	179
GUM SLOUGH	A10	12/19/88	1220	0.20	14.5	600	7.28	3.82	0.00	0.040	0.020	0.015	234
** MONUMENT ROAD										** MONUMENT ROAD			
MONUMENT ROAD	A4	02/22/88	1115	7.42	24.0	390	7.30	6.97	0.00	0.350	0.000	0.000	395
MONUMENT ROAD	A4	03/23/88	1025	7.06	20.9	640	7.32	4.10	0.00	0.000	0.000	0.000	225
MONUMENT ROAD	A4	06/22/88	1015	8.50	27.2	510	7.03	1.92	0.00	0.000	0.000	0.000	151
MONUMENT ROAD	A4	07/13/88	1015	8.62	30.0	600	7.47	1.84	0.00	0.000	0.000	0.000	201
MONUMENT ROAD	A4	08/18/88	1015	8.98	28.0	290	7.31	3.16	0.00	0.000	0.020	0.000	117
MONUMENT ROAD	A4	09/15/88	1020	9.00	29.0	332	7.48	2.93	0.00	0.000	0.000	0.000	141
MONUMENT ROAD	A4	10/11/88	1032	9.50	24.0	305	7.03	3.53	0.00	0.040	0.020	0.000	144
MONUMENT ROAD	A4	11/21/88	920	-1.00	23.0	495	7.34	2.17	0.00	0.000	0.000	0.000	196
MONUMENT ROAD	A4	12/19/88	1225	7.80	14.5	350	7.32	8.48	0.00	0.000	0.020	0.000	153
** OKALOACOOCHEE SLOUGH										** OKALOACOOCHEE SLOUGH			
OKALOACOOCHEE SLOUGH	A1	02/22/88	1000	-1.00	16.0	350	7.11	2.36	0.00	0.000	0.000	0.000	140
OKALOACOOCHEE SLOUGH	A1	03/22/88	915	-1.00	18.9	420	6.52	1.12	0.00	0.000	0.000	0.000	142
OKALOACOOCHEE SLOUGH	A1	04/19/88	915	-1.00	18.1	460	7.15	1.02	-1.00	0.000	1.000	0.000	174
OKALOACOOCHEE SLOUGH	A1	05/17/88	900	-1.00	28.0	700	7.54	1.29	0.00	0.000	0.000	0.000	225
OKALOACOOCHEE SLOUGH	A1	08/18/88	900	-1.00	26.5	425	6.75	0.34	0.00	0.000	1.000	0.000	140
OKALOACOOCHEE SLOUGH	A1	09/15/88	825	-1.00	27.0	440	7.04	0.60	0.00	0.000	0.000	0.000	121
OKALOACOOCHEE SLOUGH	A1	10/11/88	900	-1.00	22.5	431	6.92	0.94	-1.00	0.040	0.470	0.000	170
OKALOACOOCHEE SLOUGH	A1	11/16/88	1120	-1.00	25.0	460	7.14	2.13	0.00	0.000	0.000	0.000	167
OKALOACOOCHEE SLOUGH	A1	12/19/88	1040	-1.00	10.5	590	7.55	7.52	0.00	0.100	0.020	0.000	232
** PINECREST										** PINECREST			
PINECREST	A9	02/22/88	1240	5.94	17.0	460	7.33	7.36	0.00	0.000	2.000	0.000	240
PINECREST	A9	03/23/88	1148	5.54	19.2	600	7.12	6.91	0.00	0.000	0.000	0.000	259
PINECREST	A9	06/22/88	1040	6.30	25.4	421	7.05	1.75	0.00	0.000	0.020	0.000	155
PINECREST	A9	07/13/88	1100	6.16	28.5	410	7.33	2.29	0.00	0.000	0.000	0.000	162
PINECREST	A9	08/18/88	1115	6.52	29.0	300	7.14	5.11	0.00	0.000	0.040	0.000	114
PINECREST	A9	09/15/88	1055	6.61	29.0	310	7.10	3.11	0.00	0.000	0.000	0.000	122
PINECREST	A9	10/11/88	1105	5.50	24.0	250	6.95	3.99	0.00	0.020	0.040	0.000	140
PINECREST	A9	11/21/88	1400	5.76	16.5	440	7.68	7.09	0.00	0.000	0.000	0.000	219
PINECREST	A9	12/19/88	1340	5.32	14.5	600	7.36	7.30	0.00	0.110	0.030	0.000	257
** RACCOON POINT										** RACCOON POINT			
RACCOON POINT	A5	02/23/88	930	-1.00	17.0	202	7.85	8.26	0.00	0.000	0.000	0.000	79
RACCOON POINT	A5	03/21/88	1305	-1.00	17.9	230	8.42	8.80	0.00	0.000	0.000	0.000	82
RACCOON POINT	A5	06/22/88	1455	-1.00	30.5	215	8.03	12.86	0.00	0.210	0.030	0.000	69
RACCOON POINT	A5	07/15/88	925	-1.00	28.0	245	7.34	3.50	0.00	0.000	0.000	0.000	105
RACCOON POINT	A5	08/18/88	1230	-1.00	29.5	220	7.21	5.98	0.00	0.000	0.040	0.000	103
RACCOON POINT	A5	09/14/88	1220	-1.00	31.0	300	7.57	5.62	0.00	0.000	0.000	0.000	117
RACCOON POINT	A5	10/11/88	1245	-1.00	23.0	210	7.51	7.05	0.00	0.000	0.050	0.000	97
RACCOON POINT	A5	11/15/88	1110	-1.00	25.0	280	7.99	8.85	0.00	0.000	0.000	0.000	102
RACCOON POINT	A5	12/19/88	850	-1.00	8.5	225	7.85	11.97	0.00	0.000	0.040	0.000	142
** ROBERTS LAKE STRAND										** ROBERTS LAKE STRAND			
ROBERTS LAKE STRAND	A11	02/23/88	1115	-1.00	20.0	361	7.95	2.39	0.00	0.000	0.000	0.000	211
ROBERTS LAKE STRAND	A11	03/22/88	1005	-1.00	17.2	355	7.94	3.01	0.00	0.000	0.000	0.000	200
ROBERTS LAKE STRAND	A11	04/20/88	1115	3.38	23.8	420	7.25	3.75	0.00	0.000	0.000	0.000	203
ROBERTS LAKE STRAND	A11	05/18/88	915	2.60	22.5	402	7.20	3.10	0.00	0.000	0.000	0.000	210
ROBERTS LAKE STRAND	A11	06/23/88	1040	5.16	26.9	303	7.74	5.51	0.00	0.000	0.000	0.000	136
ROBERTS LAKE STRAND	A11	07/13/88	1105	5.00	26.0	390	6.92	1.25	0.00	0.000	0.000	0.000	175
ROBERTS LAKE STRAND	A11	08/17/88	1040	5.56	27.0	255	6.91	3.67	0.00	0.000	0.000	0.000	104
ROBERTS LAKE STRAND	A11	09/19/88	900	5.36	25.0	340	7.61	2.90	0.00	0.000	0.000	0.000	154
ROBERTS LAKE STRAND	A11	10/12/88	1055	5.06	23.0	360	6.91	1.17	0.00	0.000	0.000	0.000	169
ROBERTS LAKE STRAND	A11	11/15/88	1210	4.68	23.0	375	7.29	1.40	0.00	0.000	0.000	0.000	131
ROBERTS LAKE STRAND	A11	12/20/88	1340	4.00	16.0	320	7.18	4.31	0.00	0.000	0.000	0.000	187

FIGURE G1 (CONT)

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NAME-------------------- CL---  NA---  CA----  MG---  CU----  PB----  CD----  AS----  ZN----  NO3--  HG----  NUT RET

**  GUM SLOUGH                                                        **  GUM SLOUGH
GUM SLOUGH               23.00 14.000 78.000  1.200  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N
GUM SLOUGH                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
GUM SLOUGH                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
GUM SLOUGH                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
GUM SLOUGH               10.00  8.000 38.000  1.300  0.0050  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   Y
GUM SLOUGH                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
GUM SLOUGH                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
GUM SLOUGH                0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
GUM SLOUGH               15.00  9.000 55.000  2.100  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N
GUM SLOUGH                0.00  0.000  0.000  0.000  0.0250  0.0000  0.0000  0.0000  0.0170  0.000  0.0000  N   Y
GUM SLOUGH               30.00 28.000 58.000  5.600  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N

**  MONUMENT ROAD                                                     **  MONUMENT ROAD
MONUMENT ROAD            45.00 28.000 79.000  6.100  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N
MONUMENT ROAD             0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
MONUMENT ROAD             0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
MONUMENT ROAD             0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
MONUMENT ROAD            16.00 10.000 47.000  1.400  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N
MONUMENT ROAD             0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
MONUMENT ROAD             0.30 18.000 57.000  2.800  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N
MONUMENT ROAD             0.00  0.000  0.000  0.000  0.0150  0.0400  0.0000  0.0000  0.0250  0.000  0.0000  N   Y
MONUMENT ROAD            34.00 26.000 54.000  3.700  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N

**  OKALOACOOCHEE SLOUGH                                              **  OKALOACOOCHEE SLOUGH
OKALOACOOCHEE SLOUGH      0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
OKALOACOOCHEE SLOUGH      0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
OKALOACOOCHEE SLOUGH     82.00 41.000 56.000 10.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0006  Y   Y
OKALOACOOCHEE SLOUGH      0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
OKALOACOOCHEE SLOUGH     55.00 30.000 55.000 17.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N
OKALOACOOCHEE SLOUGH      0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
OKALOACOOCHEE SLOUGH     60.00 30.000 52.000  8.700  0.0007  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N
OKALOACOOCHEE SLOUGH      0.00  0.000  0.000  0.000  0.0110  0.0000  0.0000  0.0000  0.0060  0.000  0.0000  N   Y
OKALOACOOCHEE SLOUGH    119.00 50.000 82.000 12.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N

**  PINECREST                                                         **  PINECREST
PINECREST                29.00 17.000 10.700  3.200  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N
PINECREST                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
PINECREST                21.00 11.000 72.000  2.500  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   Y
PINECREST                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
PINECREST                17.00  8.000 48.000  7.100  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N
PINECREST                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
PINECREST                19.00 10.000 31.000  2.500  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N
PINECREST                 0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
PINECREST                44.00 18.000 85.000  4.200  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N

**  RACCOON POINT                                                     **  RACCOON POINT
RACCOON POINT             0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
RACCOON POINT             0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
RACCOON POINT            11.00  6.000 29.000  1.100  0.0090  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   Y
RACCOON POINT             0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
RACCOON POINT            12.00  5.000 41.000  3.300  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
RACCOON POINT             0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
RACCOON POINT            13.00  6.000 43.000  1.300  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N
RACCOON POINT             0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
RACCOON POINT            28.00 12.000 49.000  1.600  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  Y   N

**  ROBERTS LAKE STRAND                                               **  ROBERTS LAKE STRAND
ROBERTS LAKE STRAND       0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
ROBERTS LAKE STRAND       0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
ROBERTS LAKE STRAND       0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
ROBERTS LAKE STRAND       0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
ROBERTS LAKE STRAND       0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
ROBERTS LAKE STRAND       0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
ROBERTS LAKE STRAND       0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
ROBERTS LAKE STRAND       0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
ROBERTS LAKE STRAND       0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
ROBERTS LAKE STRAND       0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
ROBERTS LAKE STRAND       0.00  0.000  0.000  0.000  0.0000  0.0000  0.0000  0.0000  0.0000  0.000  0.0000  N   N
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FIGURE G1 (CONT)